Building Services News

Volume 58
Issue 4 *July/August*

Article 1

7-1-2019

BS News July/August

ISSN 0791-0878

July/August 2019

Building Services news

Ventilation – New Part F Regulations

Caden Blazes Exemplary Trail

Fuel Cell Technology

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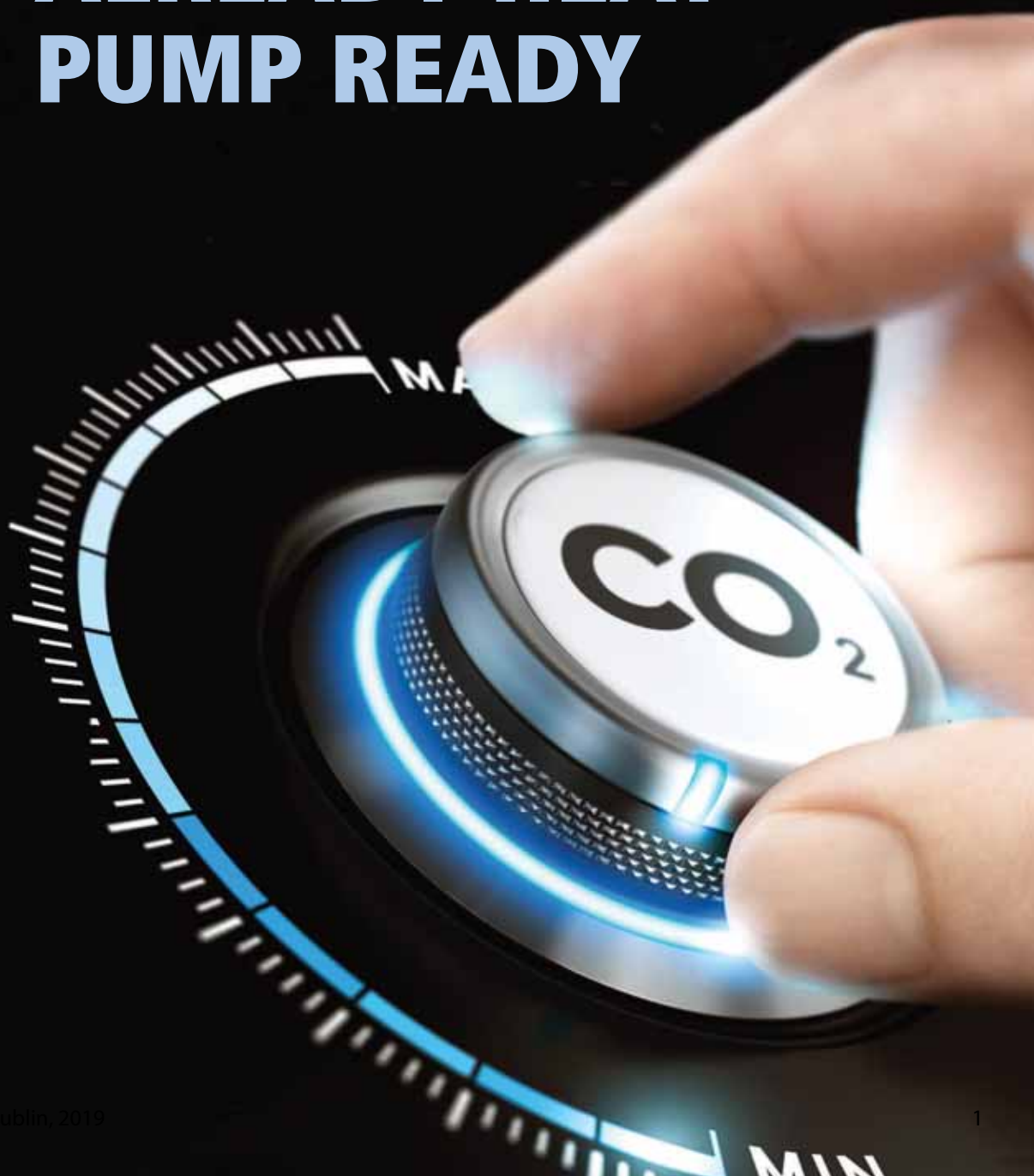

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Tender prices increases no deterrent

Anecdotal talk of tender price increases, especially in the commercial sector, were confirmed recently with publication of the latest Tender Price Index from the Society of Charted Surveyors Ireland (SCSI). This is hardly surprising given the industry skills shortage, the increasing cost of materials, and more onerous regulatory requirements, especially in relation to nZEB objectives.

Equally unsurprising is that the rate of increase is not uniform across the country, with Dublin showing a rate increase of 3.5% as opposed to an average of 2.9% for the rest of the country (with regional variations).

However, clients generally understand the reason behind the increases and also realise that the quality of buildings now being delivered – in terms of life-cyle longevity, operational costs, energy efficiencies and indoor air quality – are of a much-improved standard.

This greatly helps the value proposition, as opposed to the cost proposition, when it comes to tender prices, so it is no bad thing.

Building Services news

ISSN 0791-0878

Published by: Pressline Ltd, Carraig Court, George's Avenue, Blackrock, Co Dublin.
Tel: 01 - 288 5001/2/3 Fax: 01 - 288 6966
email: pat@pressline.ie
web: www.buildingservicesnews.com
Publisher and Editor: Pat Lehane
Design Editor: John Gibney
Advertisement Director: Joe Warren
Origination and Design: Pressline Ltd.
Subscription: One Year – €70
Printed by: Turners Printing Co. Ltd.

NEWS AND PRODUCTS

CIBSE donates guides to UCC

CIBSE Ireland presented a full suite of CIBSE Guides as a gift to those studying engineering in UCC – and who will go on to shape the environment for years to come – on the occasion of the 50th anniversary of the Chartered Institution of Building Services Engineers Ireland (CIBSE Ireland).

Free CIBSE Ireland membership is available to all engineering students in UCC and the plan going forward is for the Institution to liaise more regularly by way of planned seminars, technical evenings and joint events. Regional representative Cian Hennessy and committee member (and former Chair) David Doherty will spearhead these initiatives.

For details on the free student membership, and the other benefits CIBSE membership entails, visit www.cibseireland.org/membership/

Anita Wilcox, Liaison Librarian, College of SEFS, UCC Library pictured with Alan Carbery, Head of Academic Technology & Communication, UCC Library; David Doherty, CIBSE Ireland; Dr Dominic O'Sullivan, Civil and Environmental Engineering, School of Engineering, UCC; and Professor Liam Marnane, Head of School of Engineering, UCC.

Product award for Versatile Group

At the recent annual Irish Construction Industry Awards in Citywest Hotel Versatile Heating, Cooling & Ventilation, part of the Versatile Group, picked up the Construction Product of the Year award for its range of nZEB-compliant radiators.

Celebrating its 35th anniversary this year, Versatile has continued to grow and evolve at the forefront of innovation in design and technology and is leading the way for sustainable heating solutions for Irish homes and businesses. With nZEB (Nearly Zero Energy Buildings) efficiency standards mandatory in Ireland by 2020, Versatile is working towards providing heating, cooling and ventilation solutions for clients to meet the new standards.

Andrew Treacy, Managing Director at Versatile Group commented: "To see the high standard of competition in each category is a great showcase of the excellent standards in the industry, and the recognition we received for our commitment to innovation in the industry makes our team very proud".

Alan Crawford, Awards Judge, (second left) presenting the Construction Product of the Year award to the Versatile Group team.

Study seeks households for IAQ study

Researchers from the School of Physics at NUI Galway are seeking to recruit 100 households to measure indoor air quality within Irish homes that have been built to be highly energy efficient, by deploying remote sensors within the homes.

The research team, led by Dr Miriam Byrne and Dr James McGrath in NUI Galway's School of Physics, have initiated the project, which will investigate homes that have the highest energy efficiency standard – an A Building Energy Rating (BER) certification. The research team will use a remote sensor and continuously monitor air quality within the homes for 18 months.

The objective is to measure the following pollutants:

- Volatile organic compounds;
- Radon;
- Thermal comfort parameters;
- Carbon dioxide.

Commenting on the study, Dr Miriam Byrne said: "There is a delicate balance to be struck between ensuring that a home is energy efficient, and also providing enough ventilation to guarantee acceptable indoor air quality. The use of low-cost sensors that wirelessly transmit data will let us collect detailed air quality and thermal data over a much longer period than has previously been possible."

Contact: Dr James McGrath, School of Physics, NUI Galway. Tel: 091 493 437; email: james.a.mcgrath@nuigalway.ie

See also www.nuigalway.ie/validate

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NEWS AND PRODUCTS

Vehicle fleet – go electric

Have you considered switching your business fleet to electric? To help you on your journey, SEAI has added an "Electric Vehicles for Business" section to its website.

It provides lots of information on the benefits of switching a company fleet to electric. It focusses on key considerations such as selecting the fleet, charging infrastructure, grants and other government incentives available to businesses.

The section also features interviews with business owners on what motivated them to make the investment.

Details: www.seai.ie/sustainable-solutions/electric-vehicles/ev-for-business/

The Digital Hub energy efficiency

The Digital Hub has signed a partnership agreement with SEAI to affirm its commitment to energy efficiency. The Digital Hub Development Agency has now become a member of the Public Sector Energy Partnership Programme through which it will lead by example in its contribution to the public sector energy efficiency target of 33% energy efficiency savings.

As a first-step The Digital Hub will conduct an energy audit of active buildings on its campus with a view to scoping an energy performance contract for multiple buildings. The Digital Hub will also establish and implement a structured energy management programme, along with an action plan for energy efficiency projects, to deliver energy savings in the short and long term.

Pictured is Fiach Mac Conghail, CEO of the Digital Hub Development Agency with Gabriela Miralha da Silveira, Operations Manager, Digital Hub Development Agency and Jim Gannon, CEO, SEAI.

New ATC showroom

ATC's newly-opened energy efficiency showroom showcases its extensive range of energy efficient products which includes hand dryers, heaters, water heaters, ventilation systems and air curtains. As such it is ideal for building contractors, purchasing managers, specifiers and project managers to view in a typical situation one of the most extensive range of options in this sector on the Irish market.

Commenting after the official opening ceremony Declan Donnelly, Ireland Sales Manager for ATC, said: "We were delighted to welcome so many of our industry colleagues to the new ATC Energy Showroom.

"It was fantastic to see the products being tried and tested on the day, and I think people were impressed that they could see so many products operational in the showroom. The feedback was very positive and we look forward to having many more visitors over the coming months."

At the opening of the new showroom were Declan Donnelly, ATC with Kevin Mulvany and Daniel Lynch of Metec Consulting Engineers.

Chadwicks renovates Naas branch

Chadwicks, Ireland's leading supplier of builders' and plumbers' material to trade and DIY customers, has revamped its branch on the Newbridge Road in Naas, Co Kildare.

The refurbishment of the Chadwicks branch is part of an ongoing nationwide brand refresh by Grafton Merchanting ROI which started last summer. This is the eighth branch to have undergone a refurbishment and five more Chadwicks branches will be revamped by the end of 2019.

A new layout, shelving, flooring, signage and counters have all been installed to enhance the shopping experience. A new modern showroom has also been designed to showcase the latest trends in bathrooms, floors and doors.

Group pictured at the official opening of Chadwicks newly-refurbished Naas Branch.

Do you remember? …

2003

The year 2003 sees the completion of the controversial Spire in Dublin's O'Connell St. Designed by Ian Ritchie Architects, the first section was installed on 18 December 2002 with construction of the sculpture delayed because of difficulty in with planning permission and environmental regulations. At dusk, the base of the monument is lit and the top 10m (33 ft) is illuminated via 11,884 holes through which light-emitting diodes shine.

Also in 2003, T Bourke is appointed the mechanical contractor on the Department of Agriculture's new laboratory complex in Backweston, Celbridge. This project is one of the largest of its type with the mechanical value alone coming in at €20 million for a 24-month period. It was a complicated project due to the scale and complexity of services required, but one that T Bourke delivered without a hitch.

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A visible symbol of the new generation of high-efficiency pumps for heating and air-conditioning systems in residential dwellings is the green operating button, which together with new functions provides maximum convenience in commissioning and maintenance. Defaults for radiators or underfloor heating – symbolised by pictograms – save time during commissioning. The energy efficiency was improved once more and the power consumption is thus even lower and always in view. And thanks to the more compact construction, pump replacement is now even easier

WILO-STRATOS GIGA

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- Optional interfaces for connection to building automation using insertable IF modules

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- Highly efficient EC motor of energy efficiency class IE5 in accordance with IEC 60034-30-2
- Integrated electronic control “High-Efficiency Drive”
- Simple operation thanks to tried-and-tested Green Button Technology and a clearly arranged display
- User-friendly “X-Seal” cartridge mechanical seal and spacer coupling (from 5.5 kW) for fast and easy maintenance

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NEWS AND PRODUCTS

Isovar 2019 awards

Simply Architecture, and its new-build residential project "The Fairways" in Cork, has been named winner of the 2019 Overall Isovar Award, as well as Designer of the Year 2019. The judging panel said the entry from Simply Architecture demonstrates the perfect way of doing things in terms of sustainability and design, and showcases a stunning residential property that achieves the passive house standard.

Isovar Awards 2019 recipients – Declan McElhinney from Ceiling and Allied Ltd pictured with James Walsh from Low Energy Design; Gareth Sullivan from Simply Architecture; Brian Dolan, Managing Director of Saint-Gobain and Isovar Ireland; Paul McNally from The Passivhaus Architecture Company; Mick Cosgrave from Cosgrave Developments; and Niall Small from HJ Lyons.

The property is a one-off residential house in Douglas, Co Cork. The project team had to deal with a steeply-sloping site, previously a builder's yard, traversed by three wayleaves. It looked implausible as the three wayleaves meant only a small wedge in the corner of the site could be developed and the steep slope made access difficult.

#Calpedaplasticfree

Taking care of our planet is an increasingly-urgent issue and plastic, in particular, represents a global problem that must be tackled with great determination," says Graham Fay of Calpeda. "Even a small gesture, which goes in the direction of reducing daily consumption, can be very significant. This is the spirit that led to the #Calpedaplasticfree project.

"We wanted to implement some actions to significantly reduce our environmental impact and here are some of the measures we have implemented worldwide."

- In Calpeda, about 20,000 bottles of water are used each year, which corresponds to 500 kg of plastic waste. We've installed water dispensers and given every employee a refillable bottle;
- Plastic cups in the coffee dispensers have been replaced with biodegradable glasses;
- Plastic tableware in canteens has been replaced with ceramic ones;

This all-embracing sustainability approach also extends to Calpeda's sourcing of materials, manufacturing processes, factory location, the development of ecological products and the daily behaviour within the company.

Building 4 Wellbeing event

Wellbeing is undoubtedly the current leading trend in the construction and building services industry. How can we design and maintain buildings that improve occupants' wellbeing and productivity?

BSRIA is to stage the third "Building 4 Wellbeing" event in London (18 October 2019) where services designers, building owners/operators and other professionals in the construction industry will get together to share knowledge and learn about wellbeing-related topics.

This event will focus on the importance of designing, monitoring and maintaining buildings with the occupants' wellbeing in mind. It will teach how to quantify the different wellbeing parameters, such as IAQ and thermal comfort, and will also study the relationship between a better working environment and improved performance through real case studies.

See www.bsria.co.uk for details.

AEE conference for Dublin

The Association of Energy Engineers Europe (AEE) will hold its inaugural conference and exhibition in Dublin on 28/29 October 2020.

The theme of the event is "Driving Progressive Energy Solutions, Efficiencies and Innovations" and it will bring together energy professionals from Ireland and Europe to learn about the latest energy saving strategies, services and technologies. Participants will have the opportunity to learn from others how they can leverage the benefits of energy efficiency concepts to deliver quality projects that are safer, faster and more profitable, leading to increased stakeholder satisfaction and value for money.

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No place for 'cut and paste' design specification

The crucial role of specification writing has been so severely downgraded that it is undermining building designs, *writes David Fitzpatrick, Chair, CIBSE Patrons.*

The bad habit of using "cut and paste" specifications is leaving some clients with poorly-performing and, in some cases, unsafe buildings. More and more we are seeing a different technical solution from the one agreed by the design team being included in the written specification because it has simply been copied across from a previous working document.

This is a particular concern where the building services are crucial to health and safety – such as in fire and smoke control – but is a common problem right across the sector.

If the specification does not reflect what was agreed during design meetings, clients are well within their rights to take legal action because they will not receive the building they were promised. Also, if the specification is poorly-written or unclear, it is open to "interpretation" by the contractor. He/she can justifiably argue that what they have been presented with cannot be applied to the project in hand. They will argue that it cannot be built unless it is radically revised.

While there are many issues currently surrounding building services that are outside of the consultant's control, this is one problem the industry can solve for itself by insisting on a better standard of specification writing. However, the status of the specification writer has been relegated in importance over the years, partly because of time and fee constraints.

Disputes

This is causing confusion, pricing errors and contractual disputes, in addition to undermining the industry's and the Government's aim of reducing the cost of construction, speeding up delivery and improving quality.

Embracing digital processes would help enormously, but many of the specification templates used in the building services sector are so out-of-date that they cannot be easily translated into the formats required to support modern construction methods, and for integrating into Building Information Modelling (BIM).

No matter how much technology changes, specification will remain at the heart of mechanical and electrical engineering. How we communicate is vital if we are going to get the details right from the outset, and remove the ambiguity of interpretation that leads to compromised designs. That is why we need to adopt a consistent approach and use a format that is intelligible to all.

The lack of consistency in the way our supply chains exchange information is also increasing contractual risk, and will come under greater scrutiny in this post-Grenfell period. The current approach also encourages people to dump information at different stages of the project and then start again. This builds waste, delay and extra cost into the project process.

Contractors are often confronted by hundreds of pages of information that is not relevant to their specific role. This adds to the confusion. If we are being charitable, we could put the problem down to people not having enough time to spec the work properly, or not fully understanding the brief, but there is also an element of laziness – and in the worst cases dishonesty – involved.

The importance of a clear specification does not end at handover. In fact, the need for clearer detail becomes even more apparent during the building's operational life. Unless the art of specification writing is given the status it deserves, the original design intent will be lost and the building will fail to meet performance targets.

The specification also needs to be simple and straightforward, and not full of onerous conditions and weasely wording designed to protect the specifier's back. In the end, this is simply writing a blank cheque for lawyers.

Variations

Specifications need to be clearer and free of ambiguity because the risk of disputes and project "variations" is far too high. Late changes to the design are the enemy of good engineering and we need clear and concise writing.

The variable quality of specifications also makes it hard for estimating teams to understand what they are being asked to price. This leads them to either overprice work or to make mistakes that create problems further down the chain.

Many specifications also fail to reflect current industry standards and best practice because sections have been copied from out-of-date documents. This also leads to conflict between the contracting parties, further delaying the project and pushing up the cost.

More and more we are seeing a different technical solution from the one agreed by the design team being included in the written specification

If the Hackitt Review following the Grenfell tragedy has taught us anything, it is the importance of having a culture of collaboration in place from the outset – and before the specification is even written – so the necessary information exchange can take place and there can be technical clarity and rigour from day one. That must be the goal we all strive for … to make buildings safe and efficient. It will also cut waste from the process, which will lead to greater financial profit for everyone involved, including the end client.

It is crucial that fire safety designs in particular are precise and specific about the measures required for the building in question. Fire and smoke protection systems need to be considered as a complete package. That must be reflected in the specification to avoid the unhappy situation of contractors breaking up the component parts of the system and letting them out as separate tender packages in a bid to drive down the cost.

Active and passive fire protection measures have a symbiotic relationship and depend heavily on how they are installed in relation to each other. However, if the specification allows contractors to re-interpret the original design intent while looking for capital savings, they may not work as intended in the event of a fire. In the wake of Grenfell, the industry has a responsibility to put an end to that sort of behaviour.

Writing a specification is not something to be regarded as a bit of an inconvenience that can be delegated to someone with less experience, but more time. The art of specification is fundamental to the original design intent. Undervaluing it will undermine a building's performance and safety. ■

Quality heating and DHW solutions for large houses and small commercial applications

C&F Quadrant is a member of the Linders of Smithfield Group of companies and is a major supplier of internationally-renowned heating and plumbing brands catering for the domestic and commercial heating markets. With offices in Dublin and Belfast, and a network of regional representatives and merchant trading partners, comprehensive all-Ireland coverage is assured.

With a pedigree stretching back over 40 years' service to the heating industry, C&F Quadrant delivers quality products and system solutions.

C&F Quadrant office and warehouse headquarters in Dublin

Complementing its extensive product portfolio is a team of highly-qualified, engineering-led, personnel right through from sales to after-sales support. Products are listed on the SEAI Triple E Register which qualifies for Accelerated Capital Allowances, while BIM files are also available.

C&F Quadrant also delivers courses on domestic and commercial heating products, together with CPD presentations, at its own training facility or at client premises.

While the portfolio is very strong across all market segments served, here we highlight some of the high-output boiler options designed for large houses or even small commercial applications.

Brief brand and product details are as follows:

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Bosch GB162 50kw

The GB162 is part of a market-leading range of energy-saving condensing gas-fired boilers from Bosch. It is an extremely versatile and compact wall-hung condensing boiler that can be installed on its own or as part of a multi-boiler "cascade" system.

Features and benefits

- Up to 110% net efficiency;
- Ultra-low emissions;
- Whisper-quiet;
- Intuitive user controls;
- Integrates with solar and thermal installations;
- Quick and easy installation;
- Weighs only 70kg;
- LPG conversion available.
- Aluminium heat exchanger;
- Modulating pump;

ACV Prestige 50kW

The Prestige 50kW unit is from the ACV innovative range of wall-hung boilers and incorporates the pioneering ACVMAX system control. A key feature is the unique, self-cleaning, stainless steel heat exchanger which provides unparalleled resistance to corrosion and the additives used in modern heating systems.

Features and benefits

- Highly-efficient;
- Easy to service and maintain;
- Reduced running costs;
- Easy to install;
- Graphical user interface;
- Excellent reliability;
- Advanced control options;
- Stainless steel heat exchanger;
- Up to 97% net efficiency;
- Nox Class 5;
- Only 54kg in weight;
- Suitable for LPG or natural gas.

Vaillant Ecotec 48kW

The ecoTEC plus 48kW boiler is compact in size yet the perfect solution for large domestic projects requiring high outputs. At only 38kg, it is lightweight, easy to install, and allows for quick, efficient and trouble-free fitting. The internal ducted rain collector prevents rain ingress from the flue system depositing in the boiler casing, and the new gunmetal air separation device prevents unwanted vented emissions within the case.

Features and benefits

- Compact design;
- ErP A+-rated;
- Rain ingress protection;
- Gunmetal air separator with system pressure gauge;
- LPG compatible.
- Nox Class 6;
- Stainless steel heat exchanger.

Vaillant Green IQ 43kW

The Vaillant ecoTEC exclusive Green IQ is a combi gas boiler that is condensing and wall-mounted. It is an extremely reliable unit with an output of 43kW and an efficiency rating of 94%, making it an A-rated boiler. It has a high flow rate of 17.8 l/min. It is also environment-friendly with 85% of parts being recyclable at the end-of-life cycle. A modulation ratio of 1 to 10 ensures leaner fuel bills.

Features and benefits

- High-efficiency, high-output;
- Flow rate of 17.8 litres per min;
- ErP A-rated for both hot water and heating efficiency;
- Dimensions – W: 720mm x H: 440mm x D: 474mm;
- Green IQ badge;
- Integrated diverter valve;
- Low maintenance;
- Stainless steel heat exchanger.

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www.cfquadrant.ie

NEW PART F BUILDING REGULATIONS FOR VENTILATION

The Minister for Housing, Planning and Local Government, Eoghan Murphy, TD, has signed into law amendments to Part L of the Building Regulations, giving effect to Nearly Zero Energy Building (NZEB) Regulations and Major Renovation Regulations that he signed earlier this year. The regulations aim to make all new residential dwellings 70% more energy efficient than the performance requirements in 2005, *writes Emmanuel Bourdin, Advisor Building Standards, Department of Housing, Planning and Local Government*.

In conjunction with this, the Minister for Housing and Urban Development, Damien English, TD, has signed into law amendments to Part F of the Building Regulations, which relate to ventilation. The NZEB standard is achieved, in part, through improved air tightness in a building. New-builds will require more effective ventilation systems to achieve the improved air tightness.

Ireland introduced the definition, and the performance requirements, for Nearly Zero Energy Buildings (NZEB) in a new Part L for Buildings other than Dwellings, and in an amendment to Part L for Dwellings, both of which were published in 2017.

The 2018 revision of the Energy Performance of Buildings Directive (EPBD) highlights that energy

Emmanuel Bourdin, MEng, MIEI is an Advisor in the Built Environment Advisory Unit of the Department of Housing, Planning and Local Government. He works on regulations and standards related to Part J, Part L and Part F of the Buildings Regulations for Dwellings and supports the implementation of the Energy Performance of Buildings Directive. He has worked for 20 years in the manufacturing and distribution industries of energy management construction products.

efficient buildings should also deliver healthy indoor air quality (IAQ). Amendments call for member states to have the dwelling's energy balance calculation include health, IAQ and comfort levels and to address the issues of healthy indoor climate conditions in buildings undergoing major renovation.

To implement the EPBD and deliver NZEB, it follows that Part L and Part F must work hand-in-hand. And so it is, that in 2019, not only have these two Parts of Irish Building Regulations and their respective Technical Guidance Documents (TGDs) been updated and published together, they also have the same application date of 1 November 2019, and the same transitional arrangements.

Throughout the development of the NZEB roadmap a holistic approach has been adopted, and the Technical Guidance Document has been reviewed in parallel with Part L.

Following public consultation, TGD F (2019) introduces the following five notable updates and changes.

1. Natural Ventilation for NZEB

TGD L 2019, 1.3.4.4 states that *air pressure testing should be carried out on all dwellings on all development sites* introducing an improved maximum value for Air Permeability (AP) of 5 $m^3/(h.m^2)$. TGD F 2019 builds on these new requirements laying out the range of validity for each of three ventilation strategies:

- Centralised Continuous Mechanical Extract Ventilation (CMEV) and Mechanical Ventilation with Heat Recovery (MVHR) for dwellings should be used where the air permeability is below 3 $m^3/(h.m^2)$.
- Natural Ventilation (NV) can be used for dwellings where the air permeability lies between 3 and 5 $m^3/(h.m^2)$.

Minimum performance levels for mechanical ventilation systems

System type	Performance
Maximum Specific Fan Power (SFP) for continuous supply only and continuous extract only	0.6 W/litre/sec
Maximum SFP for balanced systems	1.2 W/litre/sec[1]
Minimum heat recovery efficiency	70%

1. For balanced systems with heating coils, add 0.3 W/litre/sec

Table 1

It follows that good design practice of NV should naturally call for dwellings with a design AP of 5 $m^3/(h.m^2)$ or near. Should the actual AP on-site be above that value, then corrective actions to improve the AP should be put in place.

Where designing a dwelling with NV at near 3 $m^3/(h.m2)$, a good practice design approach would be to design for mechanical ventilation. Indeed, should the actual AP achieved on-site be below 3 $m^3/(h.m^2)$ – easily achieved nowadays – then *appropriate additional measures should be implemented to ensure adequate ventilation* (TGD F 2019, 1.2.4.1).

2. Mechanical Ventilation for NZEB

For the first year ever on record, 2018 saw the proportion of new dwellings using mechanical ventilation outnumbering those using natural ventilation in Ireland (Figure 1)[1]. Reflecting this market landscape shift, a new guidance paragraph on CMEV has been added to the existing paragraphs of TGD F 2009 on MVHR and NV.

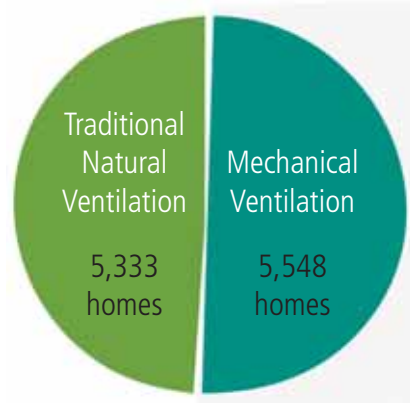

Figure 1: Breakdown percentage of new homes completed in 2018 with traditional Natural Ventilation and Mechanical Ventilation – Source SEAI 2018 BER database.
(Courtesy of SEAI)

Just like in TGD L 2019, we have added more compliance examples in TGD F 2019, including flow rate calculations for mechanical ventilation strategies[2] for houses and apartments.

TGD L 2019 provides backstop values on specific fan power and heat recovery efficiency of mechanical ventilation systems to ensure their performance will deliver energy efficiency and reduced CO_2 emission (Table 1).

3. Ensuring competency in design and installation to ensure adequate, effective means of ventilation

TGD F 2019 requires for all ventilation systems in NZEB dwellings (CMEV, MVHR and NV) to be *designed by competent designers, … installed, (balanced) and commissioned by competent installers*[3].

Ireland's training and academic providers' network is actively designing and upping the delivery of courses to provide the training necessary at all levels of the construction industry supply chain

in collaboration with the Irish Ventilation Industry Association (IVIA). A year after being awarded a Centre of Excellence, Wexford Waterford ETB opened its NZEB National Training Centre in Enniscorthy[4]. WWETB has designed a National NZEB Skills Specification Training Course to upskill all construction trades. It is working on a new course for domestic ventilation systems'installers to meet the requirements of Part F 2019.

4. Validation of installation and commissioning of all ventilation systems

Recent studies across Europe on checking the compliance rates of the ventilation systems of newly-built dwellings have demonstrated low compliance rates and under-ventilated dwellings, regardless of the ventilation strategy selected [5, 6, 7, 8, 9].

Poor on-site installation, poor design and inappropriate use/ maintenance by the homeowner have been identified as the three main reasons of non-compliance[9].

Therefore, TGD F 2019 provides that all ventilation systems in NZEB dwellings (CMEV, MVHR and NV) and mechanical ventilation systems installed in major renovations *be validated to ensure that they achieve the design flow rates – by an independent competent person certified by an independent third party, e.g. NSAI or equivalent*.

NSAI is currently completing the design of a Certification Scheme for the Validation of Ventilation Systems based on EN Standards and TGD F Installation and Commissioning Guide.

Mandatory inspection of new and existing stand-alone ventilation systems is the topic of a current review across the EU under Article 19a of the Recast EPBD 2018.

5. Ensuring homeowners can operate and maintain the ventilation

TGD F 2019 requires that for all new NZEB dwellings, regardless of the ventilation strategy selected, the home owner should be provided with sufficient information about the ventilation system, its operation and maintenance requirement, so that it can be operated in an efficient and effective manner.

Given the importance of mechanical ventilation systems functioning correctly throughout the life of the building, TGD F 2019 provides for continuous automatic monitoring of the operational status of the system with early warning of failure via control indicators for both CMEV and MVHR ventilation systems:

> *Control indicators should indicate to the occupant that the system is operating correctly and if a fault has occurred. Control indicators should be in a visible location to the occupant and not in a remote location such as in the attic or above the ceiling.*

In conclusion, quality ventilation is key to achieving healthy NZEB dwellings. In March 2019, Ireland became the 17th country in the world to join the Air Infiltration and Ventilation Centre (AIVC) Board, demonstrating the growing interest on air infiltration and ventilation issues in new and renovated buildings[10]. To mark the occasion, SEAI co-organised with the AIVC a workshop on the topic *Quality Ventilation is Key to Achieving Low Energy Healthy Buildings* at its annual flagship event, The Energy Show. A survey carried out at the end of the two-day workshop[11] suggests an Irish market in line with the changes introduced in TGD F 2019 presented here:

- The most likely ventilation strategy for a new NZEB dwelling in Ireland is mechanical ventilation, while natural ventilation can be designed to deliver healthy NZEB dwellings;
- 89% of attendees surveyed believed that a systematic inspection of new residential ventilation system should be mandatory in Ireland;
- The most important new ventilation regulatory supports required to deliver low energy healthy dwellings are:
  1: NSAI ventilation systems installation validation scheme (74%);
  2: NZEB ventilation systems installation training courses (60%). ■

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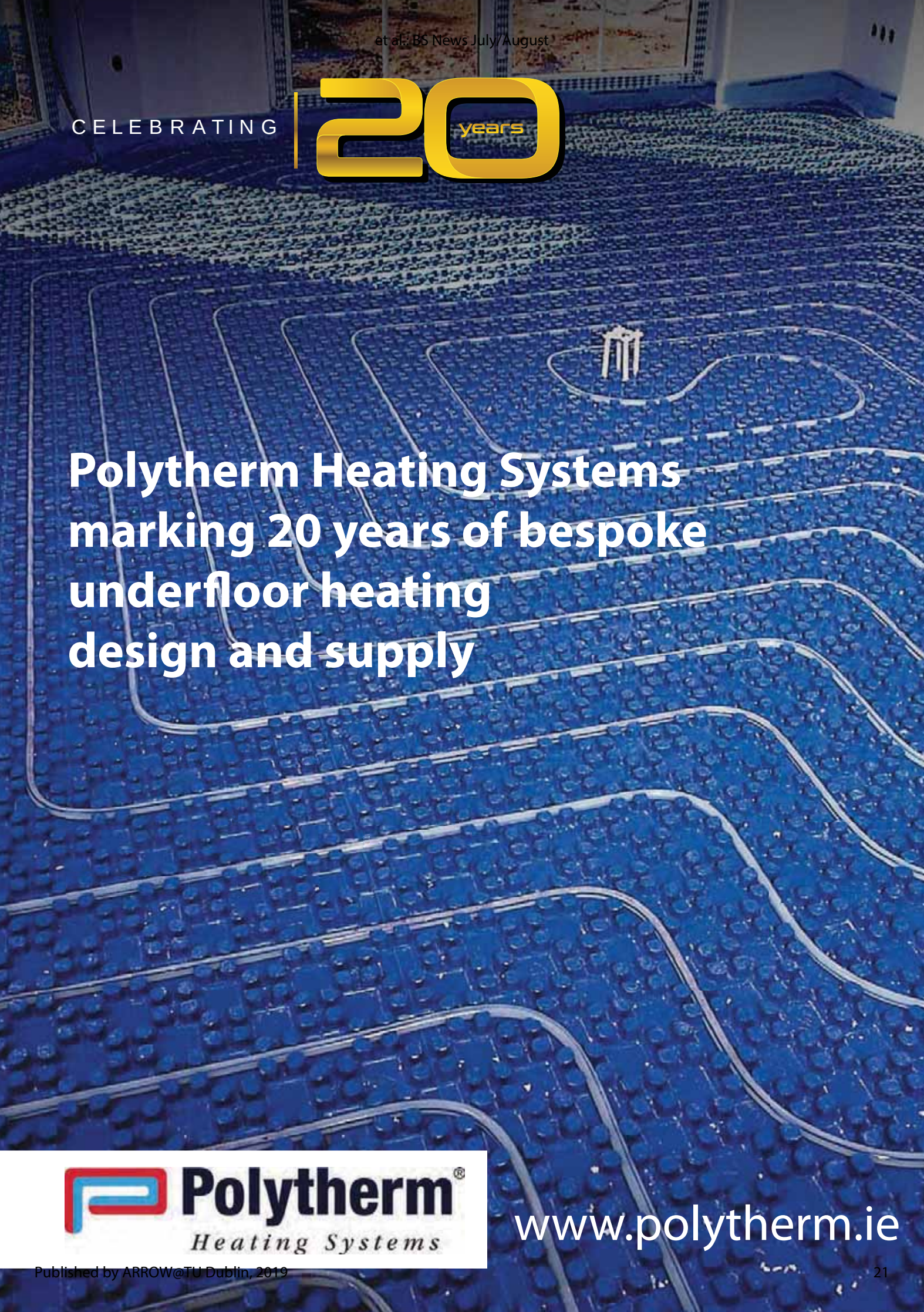
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Panasonic Big PACi split-able duct system for simpler installation

Panasonic Heating & Cooling Systems Ireland recently introduced its new R32 *Big PACi* series, a lightweight and energy-efficient commercial air conditioning solution, available in 20kW to 25kW, with big benefits for installers. Its convenient split-able indoor duct makes each section lighter and more manageable for installers, while its compact design is ideal for installation within limited and narrow spaces.

The depth of the indoor unit has been reduced by 230mm to accommodate a wider range of installations, particularly where space is limited, while still providing optimum efficiency. The indoor duct can be split into three parts – the heat exchanger, fan parts and fan casing – to provide flexible and faster installation options, especially in narrow areas. The design of the new unit is particularly suited for retrofit projects, small retail outlets and residential buildings, where space is often at a premium.

As well as its compact body, the indoor unit is up to 16kg lighter in weight than its R410 predecessor, enabling an easier installation process that can be accomplished with fewer people. This contributes to a saving in both time and resources for professional installers.

The *Big PACi* split-able duct also features an improved airflow volume of up to 24% when compared with the R410 *Big PACi* model[1] to provide optimum user comfort. It also boasts higher efficiency in both heating and cooling mode[2], with improved SCOP and COP levels.

Contact: Vincent Mahony, Ireland Sales Manager, Panasonic Ireland. Tel: 087 – 969 4221; email: vincent.mahony@eu.panasonic.com

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1. S-200PE2E5 R410A model operating with medium airflow rate of 51M^3/min compared with new S-200PE3E5B model when operating with medium airflow rate 63M^3/min

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HEAT PUMPS

INSTALLERS – 300,000 HOMES ALREADY HEAT PUMP READY

Given the recent publication of the Government's Climate Action Plan, and especially the significance and importance placed on heat pumps, *Editor Pat Lehane* had a face-to-face interview with *Tom Halpin (below), Head of Communications at the Sustainable Energy Authority of Ireland (SEAI),* to discuss the challenges posed, and incentives available. SEAI is funded by Government through the Department of Communications, Climate Action and Environment and is responsible for the roll-out and administration of the many support schemes, including the heat pump grant, designed to help achieve the plan's objectives.

PL: Heat pumps have been mooted as the way forward for a number of years now. How, specifically, do they fit in to Ireland's Climate Action Plan?

TH: *The Government's Climate Action Plan 2019: To Tackle Climate Breakdown* states: "The accelerating impact of greenhouse gas emissions on climate disruption must be arrested and the window of opportunity to act is fast closing, but Ireland is way off course. Decarbonisation is now a must if the world is to contain the damage and build resilience in the face of such a profound challenge."

In 2017, roughly a third of Ireland's final energy use was used for heating, but less than 7% of that energy came from renewable sources, a combination of biomass, biogas and solar thermal. So, as we transition to lower-carbon pathways, we must ensure the introduction of heat pumps and other low-carbon solutions in new residential and commercial buildings. The plan sets ambitious targets to reach around 600,000 renewable energy heating sources (e.g. heat pumps) in residential buildings by 2030, and around 25,000 systems in commercial premises.

PL: Everyone within the industry accepts the benefits of heat pump technology, especially for new-build. However, how do they fare in a retrofit situation?

TH: Heat pump systems operate most efficiently and effectively when generating heat at a lower temperature. For that reason, one of the grant qualifying requirements for a home is that it must have a low heat loss (defined in detail in the scheme guidance). Some homes may already be at the required performance level. Others with good insulation and glazing may only need modest upgrades. However, a home with poor insulation and single glazing may need a more substantial upgrade.

Separate to the building's ability to keep the heat in is the suitability of the home's existing pipework and radiators. The contractor will need to complete a thorough assessment of the room dimensions, from which they will derive the heating needs and the correct radiator sizes. Some or all of the existing radiators may need to be replaced.

PL: With new-build numbers representing a very small percentage of the retrofit potential, how many existing homes are heat pump-ready?

TH: We estimate that around 300,000 homes in the country are already heat pump ready, that is homes with sufficiently low heat loss that they require no additional upgrades. Even beyond that tranche of homes many more may only require modest upgrades to get them over the line.

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PL: How has this figure been identified?

TH: SEAI has responsibility for managing the national database of Building Energy Ratings (BER). There are currently over 810,000 valid BERs for homes across Ireland which is reasonably representative of the full housing stock. We analysed the data behind those ratings to identify how many homes are likely to have a sufficiently low heat loss to be suitable for a heat pump without additional works.

PL: Where homes are not heat pump-ready, what measures are required to bring them up to that level?

TH: Under the SEAI scheme, the applicant must engage an independent SEAI registered Technical Advisor before applying for the heat pump system grant. They will carry out a technical assessment as well as a full Building Energy Rating on the house. They will then provide guidance on the suitability of the dwelling for a heat pump system, based on the dwelling's heat loss. They will also guide on measures necessary to ensure that the dwelling fabric heat loss is lowered to an acceptable level for a heat pump system to perform at its best.

SEAI provides a grant for this particular technical assessment, provided that any works designated are completed and the applicant also proceeds with the actual heat pump installation.

This fits with our advice for all home energy upgrades – get expert advice to start so as you make the right choices and prioritise works for best return on your investment.

PL: These measures invariably mean a significant spend for the householder; what supports are available to achieve that?

TH: SEAI offers a number of grants for roof insulation (€400), cavity wall insulation (€400), dry-lining (€1,600-€2,400 depending on house type) or external wall insulation (€2,750-€6,000 depending on house-type). This represents around a third of the costs for a typical 3/4 bed semi-detached home. These upgrades will make the home more comfortable, easier and less costly to heat, and dramatically reduce harmful greenhouse gas emissions. Plus, with an improved BER, the value of the house increases. So there are huge benefits all round.

PL: Is the heat pump grant contingent on these measures being achieved?

TH: To qualify for the technical assessment and heat pump grants, homeowners must carry out the recommended fabric upgrades to ensure the home meets the required heat loss indicator standard. Failure to do so will result in both grants being declined.

PL: Are there any plans for tailored finance packages to support these works, especially where a householder needs to address the fabric before availing of the heat pump grant?

TH: In many cases people will be happy enough to do this work from personal savings, particularly if they are in the lower cost range. Having said that, we also know that access to trusted finance is one of the potential barriers to energy upgrades, not just heat pumps.

We are currently working with a number of different financial institutions and organisations to see what sort of innovative finance solutions can be introduced. One great example is the ProEnergy Homes Scheme now available in 20 Credit Unions, following a successful pilot last year. The scheme combines a dedicated project manager to support applicants every step of the way; a heavily subsidised home survey and report; easy access to SEAI grant funding towards the cost of approved energy upgrades; together with low-cost finance for the balance of the costs.

Another example which has been piloted with a number of employers is a salary retention scheme, where an employer actually provides the finance and is then repaid through the person's salary over an agreed period. You can expect to see a lot more finance and innovative service delivery approaches in the coming years as retrofit activity scales rapidly.

PL: In these times of skills shortage across all industry sectors, are there sufficient numbers of qualified/certified heat pump installers to meet the demand?

TH: There are currently over 1,500 contractors, across all upgrade measures, on SEAI's register of contractors for home energy grants.

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Of these there are 217 registered to complete heat pump installations. Separate to that there are over 150 BER assessors who are registered with SEAI as Technical Advisors. So, we're happy that there is a healthy and competitive supply of competent, registered installers and advisors to meet current demand.

PL: What industry supports, standards and training programmes are planned to increase these numbers?

TH: The Government's Climate Action Plan states that the Expert Group on Future Skills Needs will examine the skills needs of enterprises associated with the transition to a green growth and low-carbon economy. Regional Skills Fora will provide an opportunity for employers and the education and training system to work together to meet the emerging skills needs of their regions, supporting enterprise development under the Regional Enterprise Plans

PL: Do installers need to be qualified to a certain level, and/or registered on an approved list?

TH: Heat pump systems must be installed by suitably-qualified personnel. Personnel nominated to supervise and inspect the works, and to sign off the Declaration of Works, must be competent in the different aspects of the works. This includes design, sizing and installation of the whole heat pump system. The minimum qualification and training requirements that must be met by personnel nominated to sign off the Declaration of Works for grant purposes are:

- Fetac/QQI Level 6 Advanced Craft in Plumbing, including a module on minor electrical works, or equivalent to;
- Certificate of competence from the specific manufacturer of the heat pumps installed, based on an adequate training programme;
- Fetac/QQI Level 6 Heat Pump Systems (Course Code C30263) and supplemental Domestic Heat Pump Installation (Code 700606) or equivalent to.

Manufacturers' training programmes must be available for SEAI to examine and verify. Training outcomes must include the ability to successfully complete a heat pump system installation of the heat pump products from the specific manufacturer, and to carry out the correct heat distribution and emitters design and sizing. Installers must attend any refresher training that may be required to update their competence in relation to changes to products and technologies.

PL: How closely does SEAI work with the industry representative bodies in the heat pump sector?

TH: As with all our programmes, SEAI works very closely with all supply chain stakeholders, both in the programme design and development (particularly in pilot stages), but also in the programme delivery and refinement. A common objective of all incentive programmes is to establish a reliable and resilient supply chain in which consumers can put their confidence. This requires a partnership where SEAI sets realistic and achievable performance standards (for products and services), even when they are above prevailing market practice.

Representative bodies have an important role in informing the minimum performance standards at the outset, and then working with their members to ensure their widespread adoption and application. This ensures that homeowner and Government investments are made in the highest quality outcomes.

PL: On the commercial front, what ambitions/targets have been set?

TH: As mentioned earlier, the Government's Climate Action Plan sets ambitious targets to reach around 25,000 renewable energy heating sources in commercial premises. SEAI works across many channels with commercial stakeholders. One specific example is the Government-funded Support Scheme for Renewable heat that specifically targets commercial, industrial, agricultural and public sector clients (the non-domestic sector in other words). The scheme has a specific aim to increase the renewable heat in this sector from 9% to 12%, by offering direct financial support for renewable heating systems.

SEAI also supports the commercial sector through training and standards, such as our own EXEED Standard that facilitates excellence in energy efficient design. The purpose of the EXEED Scheme is to incentivise the investment in higher-than standard levels of energy efficient capital, and to verify their operational efficiency through a certification standard.

PL: Have specific industry types – hotels, gyms, etc – been identified as offering potential?

TH: Any business with a large heat load – hotels, gyms, hospitality and health facilities – are ideal targets for switching to renewable energy sources. This also applies to businesses which use a lot of heat in their processes. SEAI works with all these sectors through specific networks such as the SEAI-facilitated Large Industry Energy Network. We also have a team specifically focused on the SME sector and the public sector.

SEAI connects to all these sectors through the many representative bodies covering everything from agriculture to leisure. Where we have specific interventions such as the Support Scheme for Renewable Heat we actually model and measure the uptake in all these sectors and respond accordingly with focused training and support. ■


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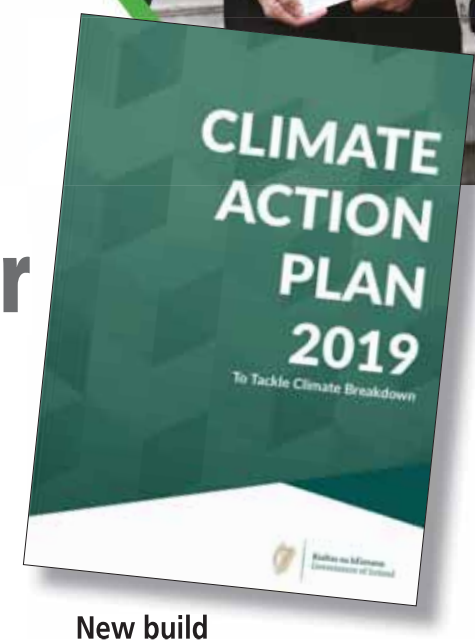

Heat pumps the answer to Climate Action Plan objectives

With the heat pump market for new-build alone just over 18,000 units last year (CSO figures) – and the figure for retrofit also rising – there is no denying that heat pumps are now the first-choice preference for space heating and hot water production across both sectors. This trend is further reinforced by the SEAI heat pump grant, and the strong emphasis on heat pumps with the Government's recently-published Climate Action Plan. As TGD2019 and the relevant Part L 2019 have been published and put into law, everything that is going to be designed will have to be in accordance with the new Building Regulations in order to meet the NZEB standard.

Here *Calin Tasnadi of the Heat Pump Association (HPA)* gives an update on the situation as viewed by the HPA.

New build

From 2011 up to now, based on TGD2011 and the relevant Part L which calls for the use of renewable technology (10kWh/sqm/annum thermal or 4kWh/sqm/annum electrical), the new-build market was driven in two directions – one-off dwellings and site developments. One-off dwellings around the country where there was no natural gas supply have leaned more and more towards heat pump technology. This was mainly driven at the beginning by manufacturers and distributors recognising and highlighting the reduced running costs compared with traditional fossil fuels. Also, there was definitely an increasing trend in the

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As TGD2019 and the relevant Part L 2019 have been published and put into law, everything that is going to be designed will have to be in accordance with the new Building Regulations in order to meet the NZEB standard.

awareness of end-users regarding the low environmental impact of heat pump technology, coupled with the savings and increased comfort levels that the heat pump system brought to their homes.

From 2011 to the end of 2018 the use of oil boilers in one/off dwellings has reduced on a yearly basis, with only a few oil boilers being installed last year. This trend is strengthened based on the fact that traditional European gas and oil boiler manufacturers have started production and distribution of their own heat pumps.

One-off dwellings "on the natural gas network" have been slower to switch to heat pump technology, mainly because of the initial capital cost of installing a heat pump system, mostly driven by builders rather than the end-user. However, once the end-user became more educated, very few one-offs around the country went down the road of a condensing boiler with PV panels. We could probably say that by the end of 2018 nearly all one-offs around the country have opted for a heat pump system for heating and hot water production.

Site developments started to happen again from late 2013 into early 2014, most of them using condensing gas boilers and PV panels, in conjunction with natural ventilation, as the cheapest option to meet the Building Regs' TGD Part L 2011.

A lot of the early site developments built immediately after the recession have two/three PV panels on the roof which doesn't really do much for the end-user – it was more of a way for the developer to "tick the compliance box" to meet Part L. Since then heat pump manufacturers and distributors have become more and more involved in these projects and, by the end of 2018, the number of site developments using heat pump technology probably equalled the number using gas and PV. In saying that, PV panels and heat pumps can work hand-in-hand if sized and designed correctly.

From 1 November 2019, as TGD Part L 2019 has been published and put into law, everything that is going to be designed will have to be in accordance with the new Building Regulations in order to meet the NZEB standard. In layman terms NZEB (nearly zero energy buildings) represents a reduction in the energy consumption of 70% and a reduction of 65% in carbon emissions, compared to TGD Part L 2005. For the end-user this means they really will have more energy-efficient homes and their carbon footprint from their home emissions will be greatly reduced.

The Climate Plan (section 9.4) calls for the effective ban on the installation of oil boilers from 2022 and the installation of gas boilers from 2025 in all new dwellings. Together with recent trends, this should mean that most new dwellings from now on will use a heat pump or some type of heat pump technology.

Retrofit

The retrofit heat pump market can be broken into three main categories:

SEAI Deep Retrofit Pilot – This is now entering its third year and gaining more and more traction. However, it is very expensive for most people, coming in at between €35,000 and €40,000. It is mainly done by people who are already looking to do major extensions and renovations. This is thought by far the best retrofit solution as it has a holistic approach – fabric, ventilation and heat pump technology. This greatly improves the comfort and indoor air quality of its occupants.

SEAI Better Energy Homes Heat Pump Grant – This is in its second year and again is gaining more and more traction as some of the qualifying criteria has been relaxed to make it more accessible. This comprises a €3,500 grant and an overall cost to end-user of around €10,000. All houses built prior to 2011 qualify for this grant, if certain criteria is met. It can be said though that most houses built from the end of the 1990s up to the end of 2011 will qualify for this grant. Still, because of its "clunkyness" and the small gap between the technical advisors and installers, this has hasn't taken off properly. However, this is set to change with manufacturers support, and as contractors get a bit more confident.

On the broader front the SEAI SSRH commercial heat pump grant scheme is in its infancy and, as yet, not very much promoted; The Better Energy Community (BEC) grant scheme, used a lot by housing associations and some local authorities, is not as strong as it was two/three years ago. It is possible that SEAI will transfer the BEC to the BEH scheme, as this would make sense.

Either way – and while there are obviously a number of serious challenges that need to be addressed along the way – heat pumps are the way forward for heating and domestic hot water production." ■

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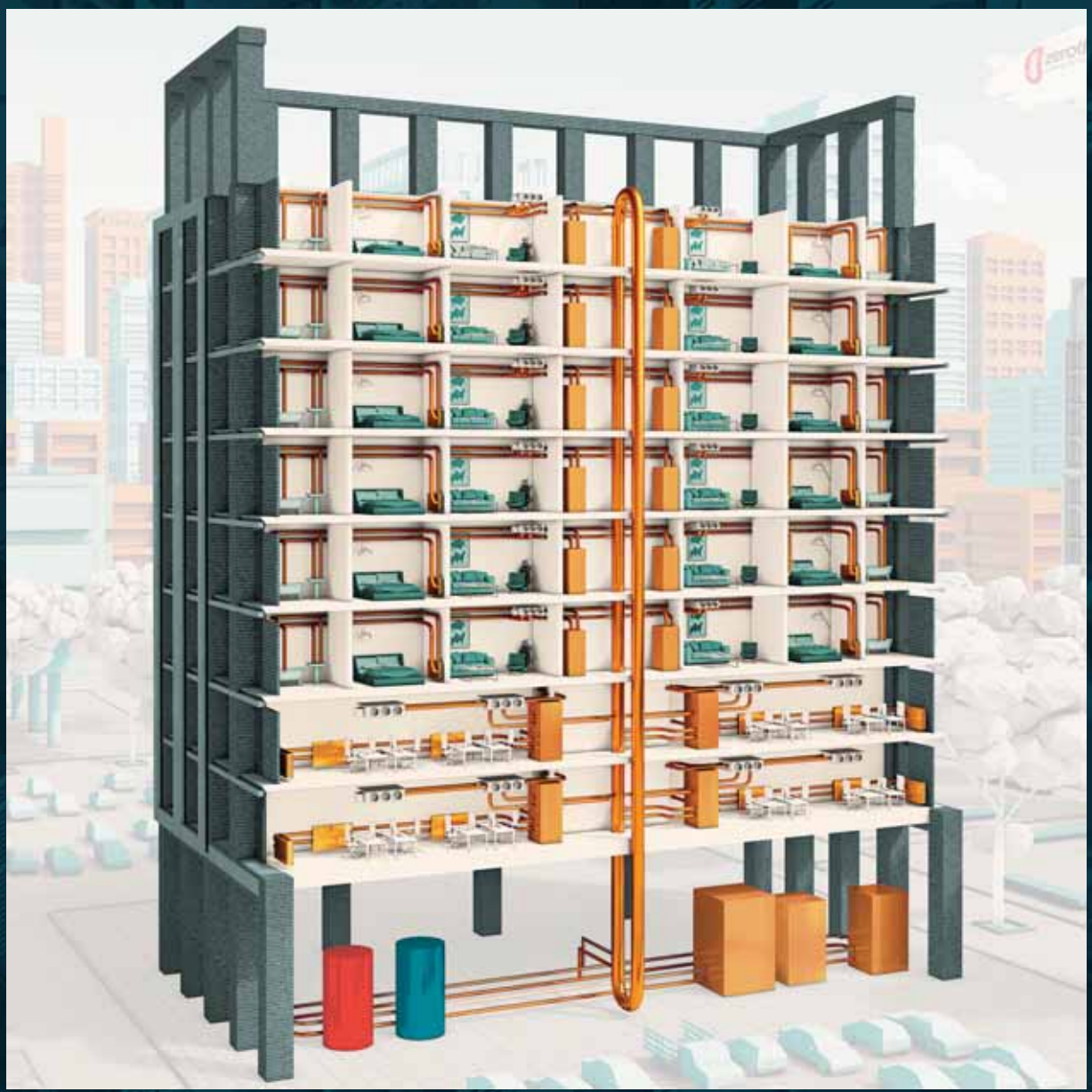

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As part of the Italian pump giant, Calpeda SPA, Calpeda Pumps (Ireland) Ltd can also boast of continuous product development, a typical example being the Calpeda Aquarius tank system. This unique pump and water storage solution was devised by Calpeda Pumps (Ireland) and is manufactured at its premises in Blanchardstown, Dublin 15.

Carrying the prestigious Guaranteed Irish symbol of accreditation, Calpeda Aquarius is designed to meet the demand for a self-contained, integrated pump and water storage solution and is suitable for applications such as houses, apartments, retail, commercial, hospitality, nursing homes, sports clubs and gyms.

Reflecting this versatility, there are multiple tank size options in capacities ranging from 100lt to 2000lt, and any number of different pump sizes with pressures up to 12 Bar and flow of 183 litres / minute. Tanks can be inter-connected for larger storage capacities.

This range of tank sizes and tank shapes means that Calpeda Aquarius is suitable for a wide array of applications in a variety of house types and locations.

The fact that the Calpeda Aquarius range is manufactured in Dublin means that project-specific solutions can also be created.

Calpeda Pumps Ireland Managing Director Graham Fay.

Easy to install

The installer has also been considered, with initial installation and future servicing kept simple. Everything relating to the pump is incorporated into the self-contained special screw-on / off lid. Servicing the pump is also straightforward and, should the need arise to replace it, the lids are interchangeable, so the installer simply needs to extract the old pump and drop in the new unit.

Every tank is manufactured from non-toxic, high-density polyethylene and certified for use with drinking water. All the materials used are non-corrodible and are UV, mould, algae and lichen resistant, while every tank is fully pressure tested and certified prior to dispatch.

All Calpeda Aquarius tanks come complete with secure access lid and screened vent, and dry-run protection built in as standard. The pumps use jacketed motor technology in order to prevent heat transfer to the stored liquid, while pressure control options are possible via the patented Calpeda ***IDROMAT*** and ***EASYMAT*** variable speed controls.

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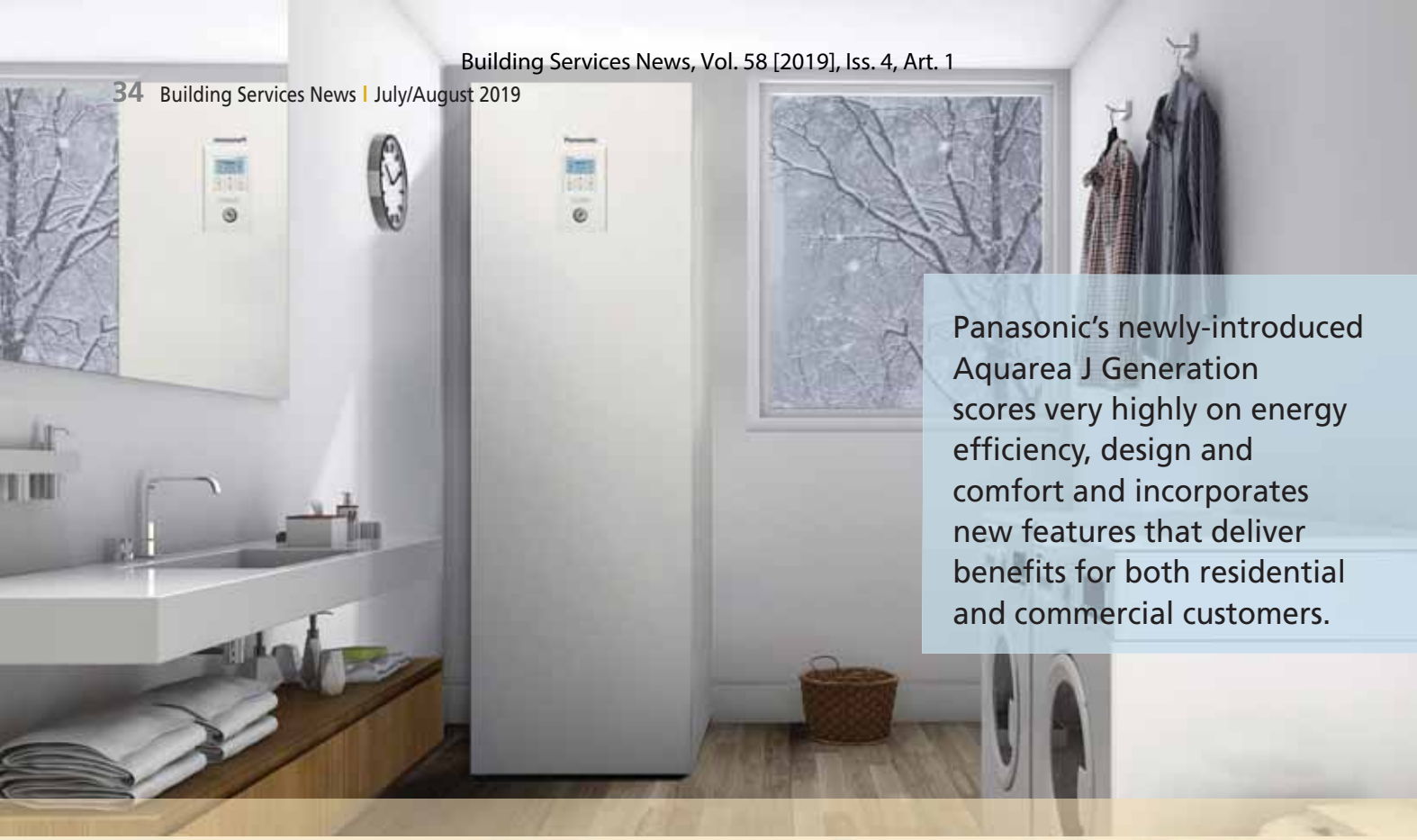

Panasonic's newly-introduced Aquarea J Generation scores very highly on energy efficiency, design and comfort and incorporates new features that deliver benefits for both residential and commercial customers.

Aquarea J Generation with R32

The Aquarea J Generation features improved heating efficiency compared with the previous generation, delivering a COP of 5.33 on the WH-UD03JE5 model and a domestic hot water (DHW) COP of up to 3.3. From September 2019, models will be rated A+++ in low-temperature operation, which is the highest energy class, according to the new Energy Labelling Directive 2010/30/EC.

To support a more environmentally-friendly approach, Aquarea J Generation uses R32 refrigerant. R32 is easy to recycle, has zero impact on the ozone layer and 75% less impact on global warming (in comparison to R410A), helping to lower the carbon footprint of a building. It is also a more economical alternative with higher efficiency (highest SCOP rating up to +5% vs Aquarea H Generation) and 30% less refrigerant used, so customers can enjoy cost savings as well as significant environmental benefits.

The new J Generation boasts improved comfort even in extremely low temperatures, down to -20˚C. There are two new sensor positions available for DHW control – users can select an option for improved efficiency and the most effective DHW COP when operating in part-load capacity; or, for greater comfort, simply select an option to reduce heat-up time when operating in full load. The J Generation also includes quieter outdoor units compared to previous models.

For both system designers and installers, extended piping lengths provide further flexibility to cater for a range of building sizes. The 3kW and 5kW capacities now have a total piping length of 25m, and provide an increased elevation difference between indoor and outdoor units from 5m to 20m. Meanwhile, the 7kW and 9kW units reach a higher limit up to 50m. A 30m elevation length also increases installation options for professionals.

For further installation flexibility, Aquarea J Generation can reach an output water temperature of 60˚C. There is also a new chiller function which can provide cooling down to 10˚C. To maximise the lifetime of an Aquarea J Generation system models include a magnetic filtration system that enhances performances and removes damaging particles.

For intelligent maintenance support, Aquarea Service Cloud is available as part of the Aquarea Smart Cloud control system. Aquarea Service Cloud will activate remote maintenance services whenever users remotely control or monitor their heating and DHW. This remote maintenance function saves time and installer visits by connecting Aquarea to a powerful cloud infrastructure to monitor remote error codes. It also makes for a quicker response to faults and other issues.

Offering capacities from 3kW all the way through to 16kW, the Aquarea heat pump range is the widest on the market, with an extensive choice of high-quality accessories such as fan coils and enamelled tanks. Suitable for new-build and refurbishment projects, the solutions are cost-effective and come with minimised environmental impact.

Contact: Vincent Mahony, Ireland Sales Manager, Panasonic. Tel: 087 – 969 4221; email: vincent.mahony@eu.panasonic.com

'Heating and DHW … it's all about efficiencies'

"As fabric and ventilation heat losses continue to decline, the emphasis going forward is most definitely on efficiencies," says Richard Sherlock, National Sales Manager, Mitsubishi Electric Europe BV. "That is why we have developed the most efficient product and system solutions now available on the market. Indeed, the high-efficiency performance of our heat pumps have not been equalled, be it for heating and especially so for DHW production.

"Mitsubishi Electric has the highest DHW Erp efficiencies on the market, across its full heat pump range. For instance, our 4Kw split model is in a league of its own with 159% primary energy efficiency as tested to EN16147 with a tapping profile of "L". Our split models under 10Kw use the newly-designed integrated cylinder unit which, in all variants, boast market-leading efficiencies.

"Coupled with a range of market-leading heat pumps, this provides the opportunity for maximum efficiency to be attained, particularly in relation to nZEB EPC (energy performance coefficient) requirements."

Mitsubishi Electric uses an external plate heat exchanger instead of a coil to heat the DHW cylinder and, as such, higher heat-up efficiencies are realised. This also shines through on the Erp certificates.

Every cylinder unit is supplied with scale-stop technology, meaning limescale is not formed on the heat exchanger. This guarantees performance throughout the system's lifespan.

"With nZEB now the industry benchmark (and a requirement shortly) – heat pumps with lesser efficiencies will be shown up," says Dave McConnell, Sales Manager Heating Products, Mitsubishi Electric.

"We at Mitsubishi Electric understand the need for high efficiency products and continually innovate to bring pioneering product and system solutions to the market. These include the Eco-Cute C02-based Ecodan heat pump, which was the winner of the SEAI Energy Show Renewable Product Award 2018.

Mitsubishi Electric's QUHZ Eco-Cute outdoor and indoor units.

Regardless of political agendas or incentives, consumers worldwide are increasingly pursuing sustainable, cost-effective alternatives to traditional fossil-fuelled equipment for their hot water and space heating requirements.

Using C02 – a natural refrigerant with the lowest GWP possible – and achieving a high coefficient of performance (COP), CO2 heat pumps offer both ecological and financial benefits.

"The unique capacity of the Eco-Cute CO2 heat pump to produce up to 90°C hot water in commercial applications, makes it suitable for use in a wide range of industrial, commercial and residential projects. Eco-Cute can also be adopted with a high level of safety as the absence of combustion reduces the risk of fire.

"Eco-Cute CO2 heat pumps use supercritical carbon dioxide as the refrigerant. The technology offers a means of energy conservation and reduces the emission of greenhouse gas.

"From the energy output side, the operational characteristics of the heat pump are different to conventional systems (such as electric/gas/oil boilers or electric heaters). With conventional systems, 1kW input of energy provides less than 1kW of output energy or heat. With a CO2 heat pump system, every 1kW of input energy consumed produces an average of three to four times the input as output energy or heat by extracting heat from the outside air.

"With cutting-edge product and system solutions such as Eco-Cute, Mitsubishi Electric is the number one heat pump choice in retrofit, and the market leader in the supply of heat pumps to the Irish market. This is a position we intend to reinforce and grow over the coming months and years as heat pumps become the first-preference choice for all heating and DHW production."

Contact: Dave McConnell, Sales Manager Heating Product, Mitsubishi Electric. Tel: 01 – 419 8800; Mobile: 087 – 798 8917; email: david.mcconnell@meir.mee.com

Therm-eco$_2$ high-temperature heat pumps work exclusively with environmentally friendly refrigerant CO_2 (R-744) and provide hot water temperatures of up to 110°C using various heat sources, while simultaneously providing cooling

pump it up!

The benefits of CO_2 Heat Pumps and CO_2 Chillers include:

- Carbon Dioxide is a natural, environmentally friendly alternative to traditional refrigerants
- Effective refrigeration with simultaneous heat production to a high-temperature level
- Effective heat recovery using industrial waste heat sources and wastewater
- Reduction of CO_2 pollutant emissions through oil and gas savings
- No exhaust fumes, particulate emissions or appreciable heat losses
- Highly cost-effective – short payback period
- Premium quality, designed and produced in Germany in line with ISO 9001:2008
- Plant-side quality inspections are certified
- State-of-the-art control technology including remote monitoring
- Compact design

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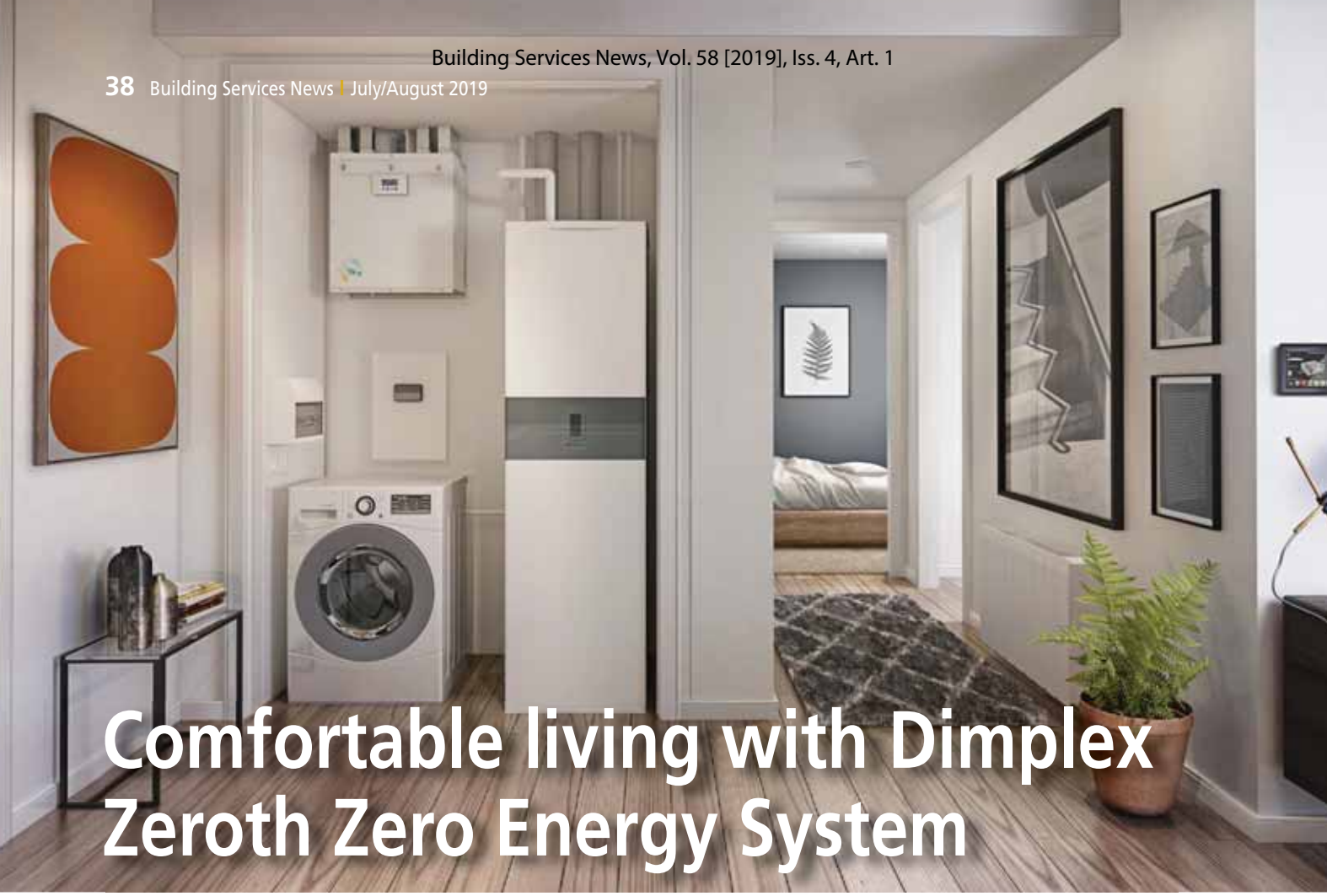

Comfortable living with Dimplex Zeroth Zero Energy System

For those who aspire to live in a modern city apartment, an unfortunate by-product of the desire for acres of glass and the need to reduce urban noise and exclude pollution are hot, stuffy living spaces.

The complexity and cost of incorporating both heating and cooling into a building's design will typically result in a premium price tag for an apartment's owner or tenant. Keeping a living space comfortable, warm or pleasantly cool should not be seen as a luxury, but as a basic requirement for living in any modern building.

With the inclusion of a Zeroth Energy System, making clever, cost-effective use of lower temperature water throughout the building, there is the assurance of a well-balanced and comfortably controlled temperature within each apartment and the communal areas. It also means the building is more environmentally friendly as it uses, and loses, less energy.

What is Zeroth?

The Zeroth Energy System provides heating, cooling and hot water services to residential or commercial spaces using a network of water-water heat pumps. The heat pumps are connected to an energy loop, which is a water circuit maintained at between 15°C and 25°C. The energy loop is maintained within operating parameters using centralised heating and a cooling plant.

The heat pump in each apartment can then be connected to a range of emitters, including fan coils, radiators, underfloor heating or fan convectors. Hot water is provided by a localised cylinder, which is charged by the heat pump.

How does Zeroth work?

The new Zeroth Energy System offers an innovative new approach to heating and cooling city apartments which is set to change the way we heat multi-occupancy residential buildings. By creating a series of "energy loops" within new buildings, Zeroth replaces conventional high-temperature systems with a cool, low-pressure system, maintained by the building's central plant room.

Above: Zeroth exempler installation as featured at the Glen Dimplex purpose-designed demonstration facility at its Dunleer complex.

Low-temperature water flows around the building's main loop to each apartment, all of which have their own "mini loop" where an individual heat pump produces heated or chilled water to the desired temperature. The water can then be passed to fan coils which deliver warm or cold air into a room through vents in the ceiling or wall, or to underfloor heating, or smart electrical, fan-assisted radiators. It means more comfortable temperatures within apartments and reduced overheating in communal areas.

What is more, the cost of heating system losses is no longer spread across all residents, meaning each one only pays for the heating or cooling they use.

For more information on the Zeroth Energy System, or any of the Dimplex products, contact Glen Dimplex Ireland. Tel: 01 - 842 4833; email: salesireland@glendimplex.com

DAIKIN

A big step setting the new heat pump standard

BLUEVOLUTION

The new generation Daikin Altherma 3

High performance The 3rd Generation of Daikin Altherma is taking you beyond the imaginable with its performance: A+++ Seasonal efficiency and operation range down to -25°C.

Easy to install - The floor standing unit only has a 60 cm² footprint and you can choose for white or silver-grey colour.

Easy to control Fully digital, the Daikin Altherma 3 can be controlled from everywhere with an app or a home control system.

For more details log on to www.daikin.ie

Grant Aerona³ R32 13kW and 17kW air source heat pumps achieve Quiet Mark

Demonstrating its commitment to driving standards within the industry and providing market-leading heating technologies, Grant has been awarded the esteemed Quiet Mark for its Aerona³ R32 13kW and 17kW air source heat pump models.

Quiet Mark is the international award programme validating and awarding low-noise, high-performance technologies which help to deliver solutions which can overcome noise pollution throughout the world. Associated with the UK Noise Abatement Society charitable foundation, Quiet Mark encourages companies worldwide to prioritise noise reduction within the design of their products. The Quiet Mark accolade is only awarded to products which meet the programme's criteria and which are identified as being among the quietest models within their given category.

The 13kW and 17kW models within Grant's new A+++ Aerona³ R32 air source heat pump (ASHP) range underwent relevant testing and assessment and were subsequently recognised for their quiet operation. These models are set to build on the popularity of Grant's existing inverter-driven heat pumps which are already well-known for their quiet and environmentally friendly operation.

In addition to delivering discreet, high-quality home heating for the end-user, Grant's Aerona³ R32 ASHPs go beyond the environmental benefits traditionally associated with heat pumps. Models within the range feature the more environmentally friendly R32 refrigerant which boasts a substantially lower global warming potential (GWP) than other typical heat pump refrigerants.

The introduction of the Grant Aerona³ R32 ASHP range comes ahead of the upcoming legislative targets outlined in the 2014 EU Fluorinated Greenhouse Gas Regulations and enables the heat pumps to be closely sized to a property's heating requirements. As a single-component refrigerant, the R32 refrigerant also ensures no temperature glide which enables the heat pump system to recharge and recycle with greater ease, helping to improve its overall efficiency.

Speaking about the company's most recent achievement, founder Stephen Grant said: "We are very proud to have achieved the Quiet Mark award for our 13kW and 17kW Aerona³ R32 models as it reflects how quiet these heat pumps are. Combined with their compact size, the Aerona³ R32 ASHPs have minimal impact on their surroundings and are our greenest, most efficient and quietest heat pumps yet."

Grant's Aerona³ ASHPs are a popular choice for properties in Ireland as they not only help meet Part L compliance outlined in the Building Regulations, but also champion exceptionally efficient performance. Each model within the Aerona³ range provides a superior seasonal coefficient of performance (SCOP), even if external temperatures were to drop as low as -20°C. The heat pumps can also generate over four times the amount of energy for every 1kW of electricity used and can therefore help improve efficiencies and savings on annual heating bills.

Complementing the low temperature operation of the Aerona³ ASHP range, Grant's product portfolio also includes the Grant Solo fan convector radiator and Grant Afinia aluminium radiator ranges and the opportunity to integrate heat pump technology with an underfloor heating system. Grant's Solo fan convector radiators are available in three models and are ideal for areas in a property that could prove harder to heat, while the Grant Afinia aluminium radiators are designed with versatility in mind and are available as either standard or vertical units which have a slim and compact footprint.

Visit www.grant.eu for more information on Grant's range of innovative heating solutions. You can also follow Grant on Facebook and Twitter @GrantIRL or Instagram @Grant_IRL.

Think Heating. Think Grant. ■

Grant Aerona³ R32 17kW air source heat pump.

Energy Saving Credits and Grant Application Assistance

Heat pump grants made easy

Heat Merchants recently announced that it can now process Energy Saving Credits for installers of Panasonic air to water heat pumps. This will enable installers to claim up to €713 in credit when they install a heat pump with controls into a home built before 2011. The Heat Merchants Energy Saving Credit Scheme also facilitates installer claims for upgrades to oil and gas boilers and heating controls, and also for power flushing of heating systems.

In order to claim the credit, the property needs to be approved under the SEAI Better Energy Homes Scheme under which the homeowner can avail of grant assistance to the value of €3,500. In order to assist installers with the grant application process, Heat Merchants' Technical Design team will provide a full heating system design and specification to meet the requirements. It will also complete all the technical information and calculations on the designer/installer tab on the SEAI file for the grant application. This can then be signed off by the contractor. To find out more contact your local Heat Merchants branch or email enquiries@heatmerchants.ie

Heat Merchants low carbon pledge

In 2018 Heat Merchants Group signed up to the Business in the Community Ireland Low Carbon Pledge together with 46 other companies. Subsequently, the first *Low Carbon Report* was published in June recording the progress to date, and confirming that the commitment to reduce direct carbon emissions by 50% by 2030 is on track to meet its targets.

As a signatory to the Low Carbon Pledge, Heat Merchants Group has already delivered significant measures to reduce emissions by a number of major initiatives. These include the following:

- Installed 470 solar photovoltaic panels at its Athlone headquarters to generate 150kWp of electricity each year which will meet 85% of the demand on site, and prevent approximately 80,000kg of carbon dioxide from being released into the environment;
- All light fittings in the Group's 45 locations nationwide were replaced with energy efficient LED lighting. This will achieve savings of approximately 667,000kWh per annum or 447,000kg of carbon dioxide;
- Four diesel fork lifts will be replaced with four new high-efficiency forklifts which will utilise most of the 3.75MWH of surplus power which is currently being generated by the PV system. This will deliver an estimated CO2 saving of 67,480kg per annum;
- In 2020 the company will begin to introduce electric cars into the fleet and will install electric vehicle charge points at all branches. This comes with the intention to change all the cars in fleet to electric vehicles over the next four years. The company will continue to implement measures as part of its Low Carbon Pledge to do its part in the transition to a low carbon economy.

Aerial shot of the roof of the Heatmerchants offices and warehouse in Athlone as the solar PV install was being completed last December.

Information evening

Heat Merchants will host an information event on the retrofit of heat pumps and the SEAI grant application process in Rochestown Park Hotel, Cork, on 22 August 2019.

Heat Merchants personnel will outline the technical design services available to installers, and the support and guidance the team can provide to installers in the grant application process.

Speakers from SEAI will outline the technical requirements for the grant, the market potential for installers, and how installers can register with SEAI to carry out retrofit installations.

Installers can also sign up for free installer training on Panasonic air to water heat pumps at the Heat Merchants Cork Branch in Pouladuff.

Contact: Heat Merchants.
Tel: 090 – 642 4000;
email: enquiries@heatmerchants.ie;
www.heatmerchants.ie ■

Engie Refrigeration's innovative Thermeco$_2$ heat pump.

High temp heat pump from Sirus

The fundamental principle of heat pumps is to absorb heat at low-temperature levels and dispense it as useful heat at a higher temperature. For instance, a heat pump can increase the temperature of geothermal energy from 10°C to 40°C. In addition to geothermal energy, it can utilise surface water and seasonal heat stores as heat sources.

But a heat pump only lives up to its full potential in terms of performance and sustainability when it converts waste heat from industrial production, exhaust air from air-conditioning systems, or waste heat from chillers, and then makes it available as heat output at a higher temperature level. Because it optimises such processes, using a heat pump generates significant energy savings.

With the help of CO_2, a natural refrigerant whose technical name is R-744, it is possible to achieve effective temperatures of up to 110°C. This opens up applications in the fields of district heating, heat provision in industrial process and drying technology.

Standard heat pumps are usually inadequate for heating potable water. When water is heated, temperatures of 60° to 70 °C need to be achieved in order to remove the risk of legionella. These high temperatures are usually generated by an additional electrical heating element, though this is not very energy-efficient.

High-temperature heat pumps like the Engie's Thermeco$_2$ – distributed in Ireland by Sirus – can provide both Low-Temperature Hot Water (LTHW) and Domestic Hot Water (DHW) without the need for supplementary electrical heating. CO_2 is harmless to use (classified as A1), cheap to procure and, with a GWP of 1, has no harmful effects on the earth's atmosphere.

CO_2 (in subcritical mode) has become standard for use in refrigeration, such as in the cooling and storage of food. At higher temperatures (supercritical mode), it is possible to implement heat pump applications that are highly-efficient in their respective temperature ranges. Supercritical applications are a relatively new field of application for CO_2 as a refrigerant.

CO_2 is pre-destined for all applications that require colder temperatures and a lot of heat at the same time. In the long term, a trend towards natural refrigerants seems likely, due to the F-gas Regulation, which is currently leading to restrictions on volumes of halogenated refrigerants.

Refrigeration and heat pump technology is key to the future of energy-efficient building services design. If we stop generating power from fossil fuels and instead generate it from renewable energy sources whose availability is permanently shifting, we will need storage facilities to provide load balance. Thermal storage can provide this load balance. CO_2 is a highly-suitable refrigerant for efficient thermal energy storage. In case of excess power in the grid, hot and/or cold thermal energy storage units can be charged with a CO_2 heat pump and discharged again when power becomes scarce.

The range of CO_2 heat pumps from ENGIE Refrigeration comprises 11 performance classes between 45 and 1,440 kilowatts. Currently machines in the performance class of 500 to 1,000kW are the most popular. Models are also available in a hygienic stainless steel design, making them ideal for sensitive applications such as the food industry.

Contact: Martin Keogh, Business Development Manager, Sirus.
Tel: 01 - 460 2600; email: martin.keogh@sirus.ie; www.sirus.ie ■

KXZR 3-pipe system from Mitsubishi Heavy Industries

The Mitsubishi Heavy Industries KXZ VRF series delivers high performance in cooling and heating for all commercial applications, and incorporates the highest level of design flexibility, improved efficiency and enhanced operational functions.

Features of the new series include the following:

- Improved energy efficiency and in mixed mode;
- Expanded line-up from 8HP to 60HP;
- Additional Hi-COP combination 16HP to 36 HP for increased energy efficiencies;
- Improved EERs and COPs compared to the previous model;
- Improved heating capacity in low ambient temperature;
- Improved cooling capacity in low ambient temperature;
- Improved and newly-designed branch control boxes.

There is now a choice of different indoor units available, with connection capacities ranging from 50% to 200%, depending on the outdoor unit model. This ensures maximum feasibility and installation flexibility.

Similar to its 2-pipe sister model KXZ, the new 3-pipe KXZR's improved EERs and COPs are due to a new multi-discharge compressor that optimises the pressure control during operation. There is also a new concentrated winding motor. These have led to increased seasonal energy efficiencies, especially in partial load conditions.

The newly-introduced "Continuous Heating Capacity Control (CHCC)" for the 3-pipe units increases the heating period of the outdoor unit and reduces the mandatory defrost operation to a minimum. This new control ensures, and dramatically increases, comfort for the user during defrost operation.

New software

The new software on the outdoor unit PCB will now also automatically select the most energy-efficient modus during "mixed mode" (both heating and cooling demand at the same time), with maximum COPs of 9.0

The outdoor units feature a new divided heat exchanger which dramatically improves cooling capacity in low ambient temperatures. This increases the operation without anti-frost operation down to -5°C.

Finally, the newly-designed branch control PFD-boxes now boast much lower noise levels, thanks to new insulation and external covers, with levels for the operation switch down to around 10db(A).

Contact: MHI distributors – Diamond Air Conditioning. Tel: 01 – 636 3131; www.diamondair.ie; DWG. Tel: 01 – 463 7311; www.dwgeire.ie ■

» The KXZR 3-pipe system offers highest levels of design flexibility, improved efficiency and enhanced operational function.

Mitsubishi Heavy Industries' 3-pipe KXZ VRF series

Daikin Altherma 3 sets sustainability standard

Drumnigh Manor is a low-density, luxury residential development on a superb site in Portmarnock, Co Dublin, consisting of 300 large A2 rated three-, four- and five-bedroom houses of superior quality and design.

Drumnigh Manor, Portmarnock, Co Dublin.

Scheduled for completion in 2023, the Drumnigh Manor development is being built to exceptional standards by Shannon Homes (Construction) Ltd with a view to offering energy-efficient properties of the very highest level. To ensure the homes exceeded all regulations and expectations, the specification brief had sustainability at its heart.

Having worked with the Shannon Homes Group for more than 30 years, Dublin-based contractors M&P Mechanical knew that choosing the right heating system was a central part of delivering a reduced carbon footprint and lower bills for residents. Consequently, they opted for a renewable air-to-water heat pump from Daikin, the world's largest heat pump manufacturer.

Daikin Altherma 3 indoor and outdoor units.

Mark O'Rourke, Managing Director at M&P Mechanical, explains: "The heating specification at Drumnigh Manor was very much a whole-system approach from the outset. We picked high-efficient QRL low-temperature radiators and the Daikin Altherma 3 integrated heat pump because they pair so well together. Getting the best out of any renewable heat source means matching it with an emitter that's designed to deliver high outputs at lower flow temperatures."

Daikin introduced its first Altherma air-to-water heat pump over a decade ago, and more than 400,000 systems have since been installed in homes and offices across the globe, making it a world leader in heating and cooling solutions.

The latest incarnation of this highly-successful model – the Daikin Altherma 3 air-to-water heat pump – boasts an A+++ efficiency label for space heating, and an A+ rating for hot water production. With Altherma 3, The outdoor unit harnesses the energy in the air and transfers it to the R32 refrigerant gas flowing between the outdoor and indoor units. The indoor unit then exchanges this energy to an integrated water tank and space heating system, in this case low-temperature radiators.

Daikin's Altherma 3 heat pump was the first heat pump on the market running on R32 refrigerant gas, which has one of the lowest global warming potentials of any refrigerant gas on the market, making the Altherma range one of the most efficient and greenest domestic heating systems on the planet.

The Altherma 3 system ranges from 4kW to16kW of heating output, with integrated or free-standing storage hot water tanks up to 300 litres, and space-saving wall-mounted systems, making it a great fit for all homes.

As a renewable energy technology, heat pumps give developers and designers an advantage when compared with fossil fuel boilers in complying with Part L of the Building Regulations, and in achieving compliance with the NZEB standard. In 2018, an estimated 50% of new Irish homes installed a heat pump as its main heating system, according to data from SEAI's National BER Research Tool. This confirms that heat pumps have come of age and also auguers well for heat pump penetration – in both new-build and retrofit alike – into the future.

Contact: Daikin Ireland.
Tel: 01 – 642 3430;
email: info@daikin.ie

Groupe Atlantic heat pump 'Best in Class'

Best in class is the only way to describe the Atlantic heat pump range. Part of the Groupe Atlantic family, the Alfea A.I (Extensa and Excellia models) provide a dedicated hydraulic conception for improved performances with a COP of up to 4.52. The inverter control adapts its power supply according to the outside temperature in order to provide the exact amount of energy for a constant and economical heating system. This offers comfort to the homeowner, whatever the weather, as well as huge savings on household energy bills.

The Atlantic heat pump range allows versatility and adaptability, and its quality controls make the user interface experience seamless. On the interior the technology is patented and unrivalled.

The range benefits from the tried and tested coaxial heat exchanger, a technology developed and patented by Groupe Atlantic to maximise the performance of the heat pump. The coaxial heat exchanger is immersed in an internal buffer tank allowing it to function without any filter trap or water flow controller. This makes the heat pump a reliable and efficient solution.

This also benefits the installer as it is literally "plug & play" with no system preheating required. The coaxial heat exchanger is very system-tolerant and has the largest heat exchanger waterways on the market. This technology differentiates the unit from all other heat pumps using plate heat exchangers.

Atlantic heat pumps come in two ranges – the Extensa A.I and Excellia A.I heat pump ranges. Both are designed to integrate with a new-build design or renovation project, with or without DHW production, and also meet nZEB compliance.

The Extensa A.I is the perfect all-round solution, producing DHW at 55°C and comes in four models from 5kW – 10kW. All single-phase, the heat pumps can work with outside temperatures from -20°C to +35°C. The Extensa Duo A.I is an adaptable, high-performance heat pump with integrated domestic hot water production and 190-litre capacity storage tank included.

The Excellia A.I heat pump is a high-temperature solution in the range with DHW production at 60°C. Its design and range of accessories makes it the benchmark in the heating sector. It comes in two single-phase models – 11kW and 14kW – and three models in the triple-phase option – 11kW, 14kW and 16kW. The heat pump is capable of working with outside temperatures as low as -25°C.

Atlantic's unique "Two Zone" kit allows two different temperatures for radiators and underfloor heating to run at the same time, and all integrated within the unit. This system provides the installer with a compact, simple and cost-effective solution. There is also a full range of accessories that caters for all applications.

The programmable controls are simple to use for the homeowner with the "Cozytouch" app available for download providing complete control on the go. Additionally, peace of mind comes as standard with Atlantic's market-leading 8-year product guarantee.

With cutting-edge patented technology, simple installation and easy maintenance, Groupe Atlantic heat pumps are truly best in class.

For more information contact Donal Mannion and Terry Warner at Groupe Atlantic Ireland, or Davies at www.davies.ie (Technical sales – Tel: 01- 851 1700).

Alezio Easylife and Alezio Compact heat pumps offer considerable installer advantages

Left: The fully-functioning 6kW Alezio Easylife with 150ltr domestic hot water cylinder, radiators and underfloor heating system at Origen Energy's Naas Road showroom in Dublin.

Established in 1684 and known for its high-performance boiler solutions, De Dietrich has now moved into the 21st century with the introduction of the Alezio Easylife heat pump range. Easy to install and operate, the Alezio Easylife is a compact, economic and environmentally-friendly solution, boasting outputs ranging from 4.5kW to 16kW. The heat pumps modulate to meet on-the-spot demand and are ideal for heating, cooling and DHW in new-build and renovation alike.

The **Alezio Easylife** heat pump is available with DHW cylinders from 150ltr to 300ltr, satisfying even the busiest of family homes. Options available include an electrical back-up using a two-stage immersion that is perfect for a new low energy house, or a hydraulic back-up that is ideal for a retrofit project. The hydraulic back-up can take in and manage the existing oil or gas boiler as a hybrid system, using the hybrid function. The Alezio Easylife will utilise the most efficient energy source depending on flow temperatures, outdoor temperature and cost of energy.

The controller is easy to use and intuitive, allowing for quick start-up, ease of commissioning and handover to occupiers, saving time for installers and reducing the number of call backs.

The **Alezio Compact** is the simple, effective heat pump solution for new buildings. It is notable for its small size and its performance: COP from 4.0 to 5.11 at an outdoor air temperature of + 7 °C (EER 3.96 to 4.75 at an outdoor temperature of + 35 °C). A high-tech product with an inverter system with power accumulator, the Alezio offers a more stable set-point temperature, substantially reduced power consumption and quiet operation.

This is thanks to its reversibility and the option of underfloor cooling (water at + 18°C) and air conditioning with convection fans. It includes a 180-litre DHW tank located under the indoor module in the form of an attractive uniform column and offers optimal comfort all year round. Its compact construction, modern design and simple installation mean it can be easily integrated in a new-build environment.

Origen has installed a functional 6kW Alezio Easylife with 150ltr domestic hot water cylinder, radiators and underfloor heating in its Nass Road training room and an Advanced HPI Evolution 6kW in the Santry training room. Both units are for live training and demonstrations that installers can avail of at any time. There is also a structured training programme and this October Origen Energy is running its next De Dietrich heat pump training session in its Santry training rooms. Customers are invited to attend to learn more about these unique products.

Origen Energy has also developed a network of service engineers, and put together a team of internal design engineers and on-the-road technical engineers. These have the right mix of on-the-tools and industry experience to supply and support your next heat pump project

Origen Energy, part of the Hevac group of companies, is proud to bring customers these air to water heat pumps. By working closely with experienced Irish installers, listening to their concerns and bringing them to Mertzwiller, France to visit the De Dietrich factory, Origen Energy is supplying a heat pump that's ideally suited to the Irish market.

In partnership with Hevac, Polytherm. TubeCo and Aluminox.

Contact: Donal Stafford, Origen Energy Ltd, Tel. 01 419 1940; email: sales@origen.ie; www.origen.ie

The Alezio Compact heat pump from De Dietrich.

ComfortZone – exhaust air Excellence from Unitherm

Unitherm Heating Systems has teamed up with the Swedish company ComfortZone to bring its pioneering range of ComfortZone Excellence exhaust air heat pumps to the Irish market. Unitherm is already an established and leading supplier of heat pumps in Ireland and this new partnership with ComfortZone extends its offering to cater for the emerging exhaust air sector.

Living with a poor-performing heat pump inspired ComfortZone founders Gunnar Hedlund and Kent Andersson – an innovative mechanical engineer and experienced mechanical contractor – to combine their respective skills and strengths to devise a new heat pump solution that is now available in Ireland.

"Innovative design, pioneering technology and advanced engineering are the hallmarks of the ComfortZone range," says Declan Kissane of Unitherm Heating Systems. "For example, it was the first Swedish manufacturer of heat pumps with an inverter controlled compressor, while an electronic expansion valve – which controls the cooling circuit more accurately – is another example where it leads R&D in exhaust air technology."

Ideal for apartments, the basic principle of an exhaust air heat pump is that the energy in the warm indoor air is recycled and sent back to the house via underfloor or radiator heat. The ComfortZone fan extracts heat from the air from all the wet rooms in the house and this is turn passes through the heat pump, where the heat is recycled, is exchanged in temperature, and sent back to the house as water-based heat. See Figure 1.

A by-product of the process is cooled ventilation of -15°C which can be expelled through a cold vent to outside, and fresh indoor air taken into the house via wall or window vents. The user sets the desired temperature and the heat pump will handle the rest, regardless of outdoor temperature.

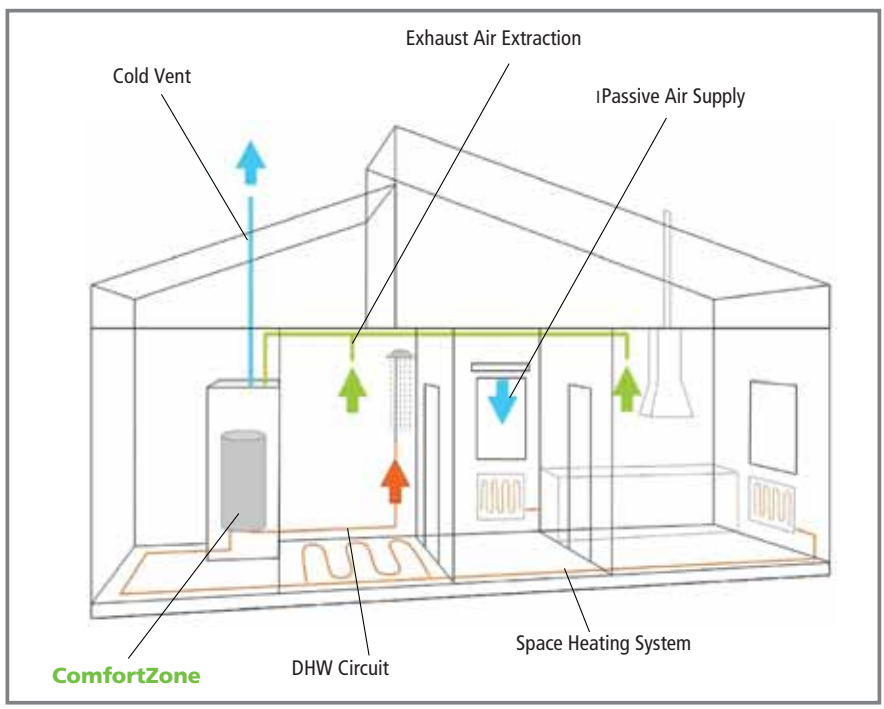

Figure 1– How the ComfortZone Excellence exhaust air heat pump works.

There are currently three models in the range –3.5kW; 5kW and 6.5kW – and all have an integrated 170lt cylinder. In addition, there are two low-rise (160 cm) models, the EX50L and EX65L. These require separate stand-alone hot water tanks and are mostly used where there are low ceilings.

ComfortZone has also invested heavily in making the interface more user-friendly. Clear symbols, a graphical presentation of savings and opportunities to fine-tune the heat curve with ease, are some examples of what can be achieved through the icon-based full colour display.

Features and benefits

- Easy to install;
- Provides heating, hot water and ventilation;
- No plant room;
- No gas connection required.
- Integrated time clock;
- Integrated thermostat;
- Quiet operation;
- Smart App control.

ComfortZone also offers a T12 module that provides a full mechanical ventilation system. A heating coil in the unit is fed from the heat pump with hot water while a heat battery in the assembly is fed from the heat pump hot water. As the air passes this battery it is heated to 17°C. Via a fan and a duct system, the pre-heated fresh air supply is then blown into the house. In this way, incoming air can be preheated using recycled ventilation air from a ComfortZone Excellence exhaust air heat pump. The unit also filters the air from soot, dust pollen, etc.

Contact: Unitherm Heating Systems. Tel: 01 – 610 9153; 091 – 380 038; email: info@unithermhs.ie; www.unithermhs.ie ■

Main image: Baxi 600 System Lifestyle unit.

Inset: Baxi 600 Heat consumer unit.

New Baxi 600 range is installers' dream

Baxi Potterton Myson has introduced a new range of system and heat-only boilers. Here we explain how the Baxi 600 System, Baxi 600 System LPG, and Baxi 600 Heat boilers offer installers even more solutions to suit their customers' home heating needs.

Installers told the company that they wanted lightweight, compact, cupboard-fit boilers and the Baxi 600 range of boilers fits that bill. With the brass fittings installers prefer and many other features and benefits designed for easy installation and servicing, Baxi Potterton Myson is confident that installers will find the Baxi 600 range their "go-to" boilers.

Fully modulating and available in 15kW, 18kW and 24kW outputs, the Baxi 600 System intelligently uses the right amount of fuel to meet central heating temperatures, saving money on fuel bills and ensuring high levels of efficiency. The dedicated 24kW Baxi 600 LPG model means that homes without mains gas can also enjoy the energy-saving advantages of the range.

The Baxi 600 System also features a central top flue and is available with an extensive range of flue options, allowing for greater siting flexibility and making it a perfect replacement boiler. Additionally, a built-in drip tray provides protection against water ingress that may come through the flue in extreme weather conditions.

Because of its low 28kg lift-weight and compact design suitable for installation in cupboards as small as 290mm deep, the Baxi 600 System is easy to fit. Combined with its seven-year warranty and front access to all components for easier servicing, it offers peace of mind to installers and householders alike.

The Baxi 600 Heat is even more compact and, at just 19.5kg, is the lightest boiler available. Suitable for fully-pumped, open-vent or sealed systems – and featuring an easy-fit wall-mounting bracket and either central top-flue or rear-flue option – it also offers great installation flexibility.

Available in outputs of 13kW, 16kW, 19kW, 25KW and 30kW, the Baxi 600 Heat is very quiet, offering minimal disturbance during use. It features the same adaptable central top-flue design as the Baxi 600 System, and with front and side access to all components, it can be serviced quickly and easily without special tools.

Unlike other brands of heat-only boilers, the Baxi 600 Heat does not require a pump overrun due to the unique efficient heat exchanger design with less thermal mass, which allows for quicker heat dissipation. These exchangers react quicker when the boiler is turned off, removing the risk of boiling water that can affect other, non-Baxi heat-only boilers.

With no need for a pump overrun, no permanent live is required to power the units. As a result, installers can save time and money during installation, as they do not need to lift carpet and floorboards during installation and make good afterwards. This also means less disruption and inconvenience for the householder.

The Baxi 600 range also includes 24kW, 30kW and 36kW Combi boilers and 24kW and 30kW Combi LPG boilers.

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Polytherm looks to the future in celebrating 20th anniversary

Formed in 1999, Polytherm Heating Systems was built on the success of the underfloor heating division of its parent company Hevac Ltd, and since its formation has provided a wide range of solutions for underfloor heating in residential, commercial and industrial sectors.

In doing so it involves sister companies (Hevac Ltd, Tube Company of Ireland Ltd and Origen Energy Ltd) in the supply of ancillary components such as pipes, fittings, valves, pumps, heat pumps, boilers, solar, controls and other products to provide a truly one-stop-shop for the plumber, M&E contractor and merchant. Polytherm Heating Systems has been at the forefront of new technologies and trends for many years. With the addition of new products such as PEX and multilayer plumbing solutions, trench heaters, radiant panels and pre-insulated pipe's, Polytherm has continued to add new and innovative products to its range.

Seamus English, Managing Director, Polytherm Ltd.

Polytherm has always sourced materials from quality manufacturers and employs qualified building services engineers and design staff. "Polytherm's *modus operandi* has always been to supply complete systems backed up by comprehensive warranty and professional indemnity and product liability insurance. In this way customers can be completely confident in our products for many years to come," says Seamus English, Managing Director, Polytherm Ltd.

Polytherm's present-day operation has evolved into a design house in which the client can be confident of the expertise – along with the huge experience – of people working in the underfloor heating industry who, between them, have a combined experience of 100 years. Polytherm is involved with some of the most prestigious projects that are being undertaken in the industry and are proud to be associated with consultants, installers and contractors who understand and promote the high-quality and standards that Polytherm aims for, and achieves.

"In today's climate we must embrace the changing environment that Polytherm operates in," says Donal Stafford, Director at Polytherm Ltd. "Our staff is key to the company's success into the future and we constantly embrace the challenges the industry presents so that they become our strengths going forward.

"Polytherm's origins and roots have given it the strength to strive on through its 20th year while learning from the lessons each of our staff have thought us. Both present and past staff are part of the roots that make us so strong in this market sector."

That said, in celebrating this milestone anniversary Polytherm's focus is firmly on the future, on the internet capability of systems and, in general, the desire to be part of the internet of things. Along with system components that enable control from anywhere in the world, our back-office systems grow to meet the demands of our progressive customers, automation of order-processing and confirmation documents.

In addition, all staff members undergo continuous training on the implementation of systems and software that enhance clients' experience, especially in relation to technological changes in design and building practice.

"In conclusion," says Seamus English, "we have had the pleasure to be involved with many types of customers. We acknowledge their importance to our past, present and future, and thank each of them for their support. Without them we could not have had the continued growth we have shared together, or the potential we envisage for our collective future."

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RACGS NEWS

RACGS champion day at Rathsallagh

The most recent RACGS outing at Rathsallagh Golf Club in Co Wicklow followed the same pattern of all Core AC-sponsored outings in that the weather was excellent, the course was in magnificent condition, and the turnout was one of the largest ever. Not sure what Austin McDermott and his Core colleagues have going for them but long may it continue.

Austin McDermott, Core Air Conditioning with. Liam Hoctor, runner-up, Class 1.

It was also great to see a lady, Dee Bruce, participating, and especially to see her win the visitors prize with a score of 34pts.

Rathsallagh is a championship golf course and, as such, a long and challenging one. In the circumstances, the scoring was excellent with Martin Baneham, playing off a handicap of 16, taking the overall prize with 35pts.

Austin McDermott, Core Air Conditioning with Dee Bruce, winner of the visitors prize.

Austin McDermott, Core Air Conditioning with Kevin Roden, winner longest drive.

Results

Class 1: Kevin McGurty, H11, 34pts; Runner-up: Liam Hoctor, H9, 34pts.

Class 2 Winner: David Brown, H21, 33pts; Runner-up: Fergus Daly, H22, 31pts.

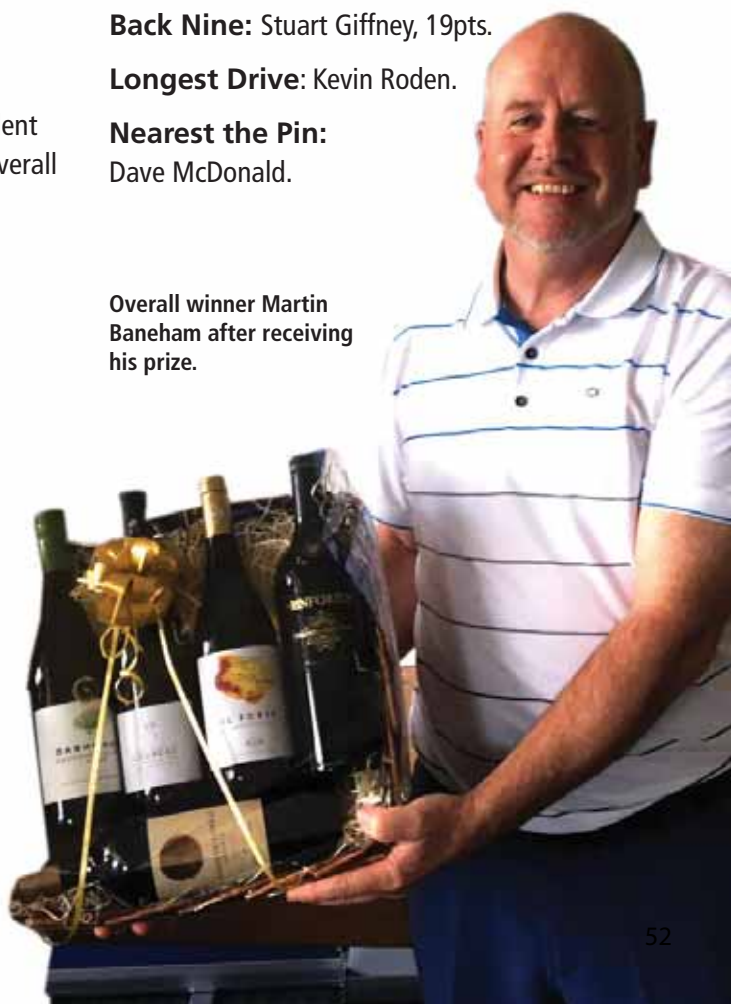
Visitors Winner: Dee Bruce, 34pts; Runner-up: Tom Whelan, 33pts.

Front Nine: John Ryan, 21pts.

Back Nine: Stuart Giffney, 19pts.

Longest Drive: Kevin Roden.

Nearest the Pin: Dave McDonald.



Overall winner Martin Baneham after receiving his prize.

Simultaneous heating, cooling and hot water by EnergyPower

On complex buildings where there is a need for simultaneous heating and cooling, along with a constant flow of hot water, EnergyPower from Clint is the perfect solution. The EnergyPower range includes air cooled units featuring scroll compressors or inverter screw, and features multi-functional units for 4-pipe systems that operate with R410A or R134a refrigerant and are the perfect integrated answer for hotels, hospitals, commercial buildings, etc.

With EnergyPower, the maximum energy efficiency can be obtained when compared to traditional "chiller + boiler" solutions where air conditioning is provided by a liquid chiller, and the heating and domestic hot water is supplied by a boiler.

When the requirement is for both cool and warm water at the same time, EnergyPower's heat recovery system recovers and exploits the thermal energy produced by each exchanger to activate the other, with a consequent gain in energy consumption.

Another advantage of the single unit is a noticeable gain in occupied space on service areas, and simplification of system configuration which means reduced on-site operations for installation and maintenance.

Usually units are sized so they can meet the exceptional peak demands in cooling or heating and this means that for most units' working lifespans they don't operate at maximum potential power but at partial load. However, to deliver the highest efficiency on normal daily use, EnergyPower features technical solutions to ensure excellent Total Efficiency Ratio (TER) energy coefficients. On the dedicated air cooled models with inverter control on mono-screw compressor with satellite, the speed of compressor is modulated according to the real requested load, thus reducing starting currents and energy consumption at part load.

On the dedicated multi-scroll air cooled models the multi-compressor design allows power partialisation based on the requested load. This reduces the power input both at start-up and during part load functioning. Part load efficiency can be further improved by the inverter control on axial fans and circulating pump which is available as an added accessory. EnergyPower units can also be equipped with a web monitoring system for remote management.

EnergyPower's technology is based on the combined activity of three heat exchangers — one finned coil type to exchange energy with external ambient and two shell and tube exchangers. When simultaneous production of hot and cold water is requested they work in combination, one as condenser, one as evaporator, excluding the finned coil. Maximum efficiency is ensured since thermal energy is recovered and not disposed to the ambient.

When only cooling or only heating is requested, the finned coil is used to exchange energy with external ambient. This shift between the different exchangers is made possible by solenoid valves, controlled by a microprocessor, that divert the refrigerant flow to the heat exchanger suitable for the requested operation mode.

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Blazing an exemplary trail for women in engineering

Jacinta Caden

From "the tools" to the top of the refrigeration engineering profession, Jacinta Caden – now Business Development Associate, Europe, Critical Project Services – has done it all. Little did she think when she started in DIT Bolton St as a refrigeration and air conditioning trade apprentice at 22 years of age that in June 2019 she would be named among the Top 50 Women In Engineering (WE50) by the Women's Engineering Society (WES) in the UK.

Sam Buckell, Chair of the Institute of Refrigeration Women in RACHP (WiRACHP) Network presenting Jacinta Caden with her *ACR Woman of the Year Award* in January 2019.

She has been immersed in male-dominated industries from the very beginning and it was normal for her growing up to explore all things engineering.

However, Jacinta is no stranger to such accolades. She was only the fourth female in 119 years to be elected to the Board of Trustees for the Institute of Refrigeration (IOR) in the UK, and in January of this year was named *ACR Woman of the Year*. She is also a member of the Steering Group for the WiRACHP (Women in Refrigeration Air Conditioning & Heat Pumps) Network. Although WiRACHP is a more industry-specific organisation, its primary focus is very similar to that of WES.

The WE50 awards take place each year to coincide with International Women in Engineering Day (INWED) on 23 June, a day endorsed by UNESCO patronage since 2016. INWED celebrates the achievements of women in engineering and related roles, and highlights the opportunities available to engineers of the future.

The WE50 were judged by a panel of industry experts and head judge, Dawn Fitt, commented: "As a former engineering technician apprentice it has been a pleasure, and encouraging, to see at first-hand the fantastic achievements of both current and former apprentices. This is particularly heartening given the push to increase the apprenticeship numbers within the industry."

Jacinta is the living embodiment of this route to success. She is a qualified refrigeration engineer and has been working in the industry for over 16 years. She began her apprenticeship with an RAC contractor in Dublin while, for the off-the-job phases of her studies, she attended both what were then DIT Bolton St, Dublin and FÁS Cork.

Since then she has progressed from the practical, hands-on side of the industry through to various roles including technical, design, sales and managerial positions. Her role with Critical Project Services (CPS) is to develop the European business through the management of clients who have new-build, retrofit or upgrade requirements on their data centres.

CPS is a management consultancy business dedicated to the mission-critical industry. It predominantly delivers project management, program management, site selection, project control, D&B, procurement, commissioning and assessment services.

Jacinta comes from Mayo where her family have refrigeration, electrical and haulage businesses for over 50 years. She has been immersed in male-dominated industries from the very beginning and it was quite normal for her growing up to explore all things engineering. She now realises how fortunate she was to have had those opportunities and that encouragement. Consequently, promoting women in engineering roles – whatever the discipline – is important to her.

The other passion Jacinta has is for driving. She caught that bug from an early age, to the extent that she has a licence and the qualifications to drive coaches and even articulated trucks. She has a weakness for "anything speed" and says watching truck-racing is her favourite. Her highest tandem parachute jump was from 13,000ft, while she also has a wing-walk under her belt. In addition, she likes climbing mountains, yoga, travelling and going home to Ireland to see family and friends.

"As an RAC engineer myself I know how rare women with this qualification are. Indeed, during my time as an apprentice in Ireland I was the only female doing RAC. Hopefully, that scenario will now change thanks to new initiatives designed to attract not just females, but also males, into refrigeration apprenticeships."

Jacinta receiving the WE50 Award from Dawn Childs, President of WES, one of the Awards' judges and Group Engineering Director at Merlin Entertainments.

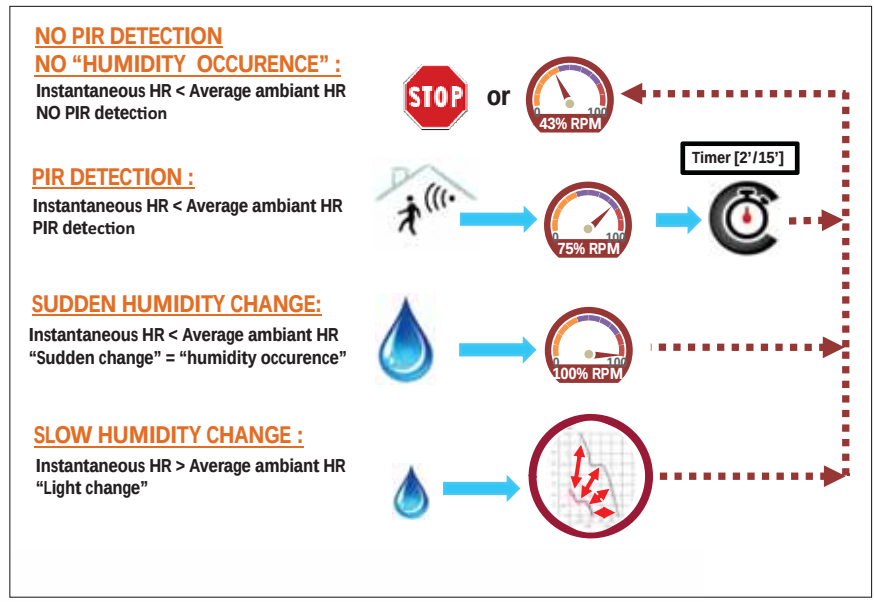
Jacinta's story illustrates the importance of the apprenticeship route into engineering, and also clearly demonstrates its value in career development/advancement opportunities. However, there is still a lot to be done. The industry needs to recognise this and act accordingly if it is to attract more young – and enthusiastic – people into the sector. ■

New Silent Dual Series smart fan from S&P

The new Silent Dual Series smart axial extractor fan from S&P Ireland Ventilation Systems is autonomous and self-adjusts the way it is operating, depending on the environmental conditions and ventilation demand. It does this by way of two sensors, one a PIR detector and the other a humidity sensor, and is simply installed by way of a 2-wire connection.

The incorporation of a sophisticated control algorithm allows the extractor fan to self-adjust the set points according to the environmental conditions. This is especially important in operational areas where, for instance, there are permanently high/low humidity levels, or where there is a sudden increase in humidity when someone takes a shower.

Continuous control means that the controllable AC motor reaches the performance level required to meet the actual ventilation need, while the demand control ventilation (DCV) concept improves energy consumption and reduces noise levels.



The algorithm manages four regulation levels of the motor.

The extractor is mounted flush with the wall so that there is no gap.

Meanwhile, the integrated PIR detector has a wide 180° detection angle (installed on the wall) which gives it considerably better detection compared with other products on the market.

The aerodynamic design means that air performance is similar to a frontal air intake but with the addition of a trim, while the unit is optimised to give higher pressure at low airflow rates than classic "design" fans. A back-draught shutter is mounted to the main support with integrated outlet fairing to improve aerodynamic performances.

The bi-material cover ensures IP45 grade protection to the electronic PCB, the sensors and the terminals. Part of the cover, right over the terminals, opens thanks to a rubber hinge from the same piece, to connect the fan to supply.

Easy connection is assured with only two wires (L, N). There is no need for the user/installer selection, and run-on time by dip-switches, is simple.

The S&P Silent Dual Series comes in one version and in three sizes – RH+PIR version Ø 100, 125mm and 150 mm – and modular electronics incorporating basic PCB with quick connector to link new functions (BLE + RTC) by the user or in the factory. The motor is mounted in its support with "silent-block" to reduce both vibrations and noise transmission

Silent Dual models have an integrated LED indicator light and are already prepared for possible future revision of the ErP Regulation, including all kinds of fan units.

Contact: Tristan Healy, Business Development Manager, Soler & Palau Ventilation Ireland.
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GAS NETWORKS IRELAND – breaking new ground with *Dial Before You Dig Online*

Gas Networks Ireland (GNI), the operator of Ireland's gas network, will introduce a new online version of its *Dial Before You Dig* mapping service in September. The new online service, which complements the existing *Dial Before You Dig* phone and email service, will make it easier than ever to check whether there are underground gas pipes on a site before you commence work. The easy-to-use *Dial Before You Dig Online* can be accessed at www.gasnetworks.ie

Throughout Ireland, vast underground networks of pipes and cables supply vital utilities including gas, water, electricity and tele-communication services, operating safely and efficiently, day and night, to keep Ireland functioning. But when these utilities are damaged by construction work it can cause major disruption, or even serious injury or death.

Gas Networks Ireland operates the 14,390 km national gas network, which supplies clean, affordable and efficient natural gas to over 700,000 homes, businesses and industries across Ireland. Gas Networks Ireland is also responsible for the safety of the gas network.

Last year, there were 550 incidents of damage to the low and medium pressure gas distribution networks, mostly in urban and suburban locations, and there were nearly 50 instances of unauthorised excavation near the high-pressure gas transmission network, mostly located in rural areas. In the first half of 2019, there have already been nearly 350 incidents of damage to the distribution network – a sharp increase, driven by the current construction boom.

A key control to prevent this risk of damage is access to utility maps from utility owners. All utility owners operate systems to provide maps of their pipes and cables on request. In 2018, the *GNI Dial Before You Dig* service dealt with nearly 10,000 such requests and has already seen a 15% increase in requests in the first half of 2019, compared to the same period in 2018.

The new online service makes it easier than ever to ensure a safe dig. Users can select the location they want drawings for, check out the gas network at that location and have the drawings emailed to them. Vital drawings, that would normally take 48 hours or longer to arrive, will be available in minutes, day or night.

Owen Wilson, Networks Safety Manager with Gas Networks Ireland, said: "Any responsible contractor will want to make sure that they operate a safe site. Obtaining maps of under-ground services is a critical step when planning any excavation. Our new online *Dial Before You Dig* service can provide these drawings far quicker and easier than ever before."

Paul O'Brien, Gas Networks Ireland Design Services Manager with responsibility for the *Dial Before You Dig* service, added: "Before we embarked on developing this new system, we surveyed users of our current system and asked them what they'd like from an online system. We've incorporated their feedback into this service so we're really confident that it will deliver everything that users want and more".

Users who prefer phone or email will still be able to contact Gas Networks Ireland by calling 1850 42 77 47 or emailing dig@gasnetworks.ie to request maps as they have always done.

BTU GOLF NEWS

Family affairs at Captain's Day in Hermitage

The sun shone brightly recently by the banks of the Liffey in the leafy surroundings of Hermitage Golf Club for Paudie Gillen's BTU Captain's Day outing, which was sponsored by Thermal Insulation Distributors Ltd.

Not surprisingly, the golf course provided a stern challenge with the speed of the greens generating much conversation. However, the full time sheet and wonderful weather made for an excellent day of golf, networking and socialising.

It was also a day for families. The Captain's prize was won by Paudie's son, Shaun, while also in attendance for dinner was former captain and president, Tony Gillen. Meanwhile, Damian Mooney hosted his three brothers, and their dad also joined them for dinner.

Overall winner Shaun Gillen with BTU Captain Paudie Gillen.

Shaun Gillen, TIDL, sponsor with John Littlefield, second, Class 2 and BTU Captain Paudie Gillen.

Shaun Gillen,TIDL, sponsor with Des Bindley, third, Class 3.

Results

Overall winner
Shaun Gillen, 34 pts.

Class 1
Winner: Joe Warren, 31 pts;
Second: Michael Kearney, 31 pts;
Third: Sean Smith, 30 pts.

Class 2
Winner: Maurice Kelly, 32 pts;
Second: John Littlefield, 30 pts;
Third: John White, 29 pts.

Class 3
Winner: Paudie Gillen, 37 pts;
Second: Stephen Costello, 25 pts;
Third: Des Bindley, 20 pts.

Front 9: Bernard Costello, 16 pts.
Back 9: Vincent Broderick, 15 pts.

Longest Drive: Shaun Gillen.
Nearest the Pin: Paudie Gillen.

Visitors:
Winner: Ken Francis, 36 pts;
Second: Ross Gillen, 36 pts.

Xylem Water Solutions at Clayton Charlemont Hotel project

Xylem Water Solutions Ireland is the Irish arm of the world-renowned Xylem water technology group that is committed to "solving water" by creating innovative and smart technology solutions to meet the world's water, wastewater and energy needs.

Xylem's technological strength across the life-cycle of water is second-to-none. From collection and distribution to reuse and return to nature, its highly-efficient water technologies, industrial pumps and application solutions not only use less energy and reduce life-cycle costs, but also promote sustainability.

In a world of ever-growing challenges, Xylem delivers innovative water technology solutions across all industry segments, and does so by partnering with mechanical consultants and contractors to devise tailored solutions that are project specific.

It is in this context that it has worked very closely with Kerrigan Mechanical on the prestigious four-star Clayton Charlemont Hotel, Charlemont Street, Dublin 2 that was constructed in 2017/18 by Northern Ireland firm, McAleer & Rushe Ltd.

"Having worked on the design with our online pump and booster selection software, Xylect (www.xylect.com)" says Kevin Devine, General Manager Sales, Ireland, "we ultimately ended up supplying all of the booster sets, circulating pumps, pressurisation sets, heat exchangers, CAT 5 booster sets, submersible pumps, etc.

"As in all projects, lead time and commissioning/after sales service were critical to the contractor and client in the decision-making process. On the fulfillment side – with warehouses in Dublin, Axminster (UK), Venice and Metz (France) – we comfortably met the targeted delivery deadlines for all plant.

"Once the project was completed and fully installed, Paddy Hearty, Commissioning Engineer, Xylem Water Solutions Ireland, worked very closely in conjunction with Adam Dent, Project Engineer with Kerrigan Mechanical, to commission all the plant supplied by Xylem to the site.

"This is a very high-profile project and one that clearly illustrates Xylem's ability to 'solve water' no matter what the scale or complexity of the project, and our ability to successfully work with with consultants and contractors in delivering high-performing, energy-efficient solutions."

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Project
Clayton Charlemont Hotel

Contractor
Kerrigan Mechanical

Above and right: Two sections of the plantroom at the Clayton Charlemont Hotel in Dublin, showing some of the Xylem equipment installed.

THE BENEFITS, LIMITATIONS AND FUTURE FOR STATIONERY FUEL CELLS

Dr Tom Houghton

Dr Tom Houghton is a Managing Consultant with E4tech where he is sector leader for the Systems Transition Enablers sector. He has considerable experience in hydrogen and fuel cells having completed a PhD on hydrogen energy systems modelling in 2011. He gained early experience in the power sector with Alstom and since then has worked several years in the banking sector and, more recently, as an academic researcher in energy systems economics.

The use of hydrogen fuel cells (FC) in the built environment is by no means new and their potential contribution to decarbonisation efforts have been recognised for some time. Numerous FC installations exist across North America and Asia and, to a lesser extent, Europe for both continuous power and back-up power applications. However, progress has been slower than many had predicted. Here *Dr Tom Houghton, Managing Consultant with E4tech,* explores some of the benefits and limitations of stationary fuel cells, and discusses what the future holds.

Fuel cells convert fuels directly into electrical energy through an electrochemical process and can attain very high levels of energy efficiency, especially if operated in a combined heat and power (CHP) mode where the heat generated is recovered and made use of. Several different technologies are in use, each with a specific set of advantages and disadvantages, but solid oxide fuel cells (SOFC) dominate overall in the stationary sector (see Figure 1).

In the larger-size bracket, phosphoric acid fuel cells (PAFC) are also prevalent and, in smaller scale units, proton exchange membrane (PEM) fuel cells have a significant role to play. The principal fuel is natural gas which can be fed directly into SOFC and PAFC units, while PEM fuel cells, which only run on hydrogen fuel, require an additional external reformation step to generate high-purity hydrogen for injection into the FC.

Fuel cells bring potential benefits in terms of reliability and, given the absence of moving parts, reduced maintenance costs when compared with alternatives such as diesel generators or gas turbines. They can also offer quieter operation, an important factor in certain locations.

In addition, they produce significantly lower NOx and carbon monoxide emissions relative to combustion of

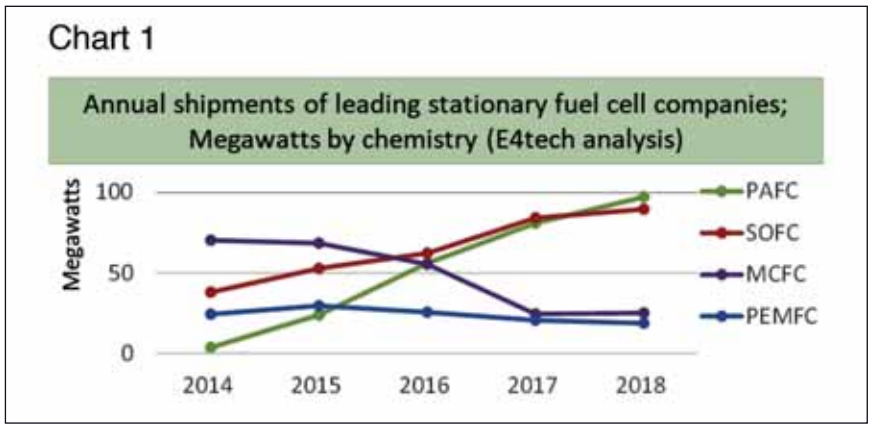

Figure 1.

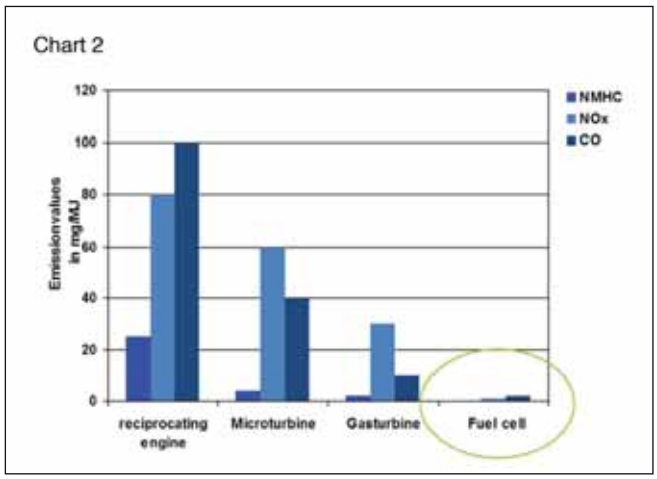

Figure 2.

fossil fuels in both engines or heating boilers, making them well-suited to installation in densely-populated areas where scrutiny of air pollutants is increasingly intense. Carbon emissions too can be lower than for an equivalent-sized diesel generator, but CO2 reduction potential is limited where the fuel used is natural gas (see Figure 2).

The most significant support for the deployment of stationary fuel cells is in Japan where the Ene-Farm programme of subsidies has overseen the deployment of around 300,000 CHP units in domestic and commercial properties over the last 10 years. Over that time subsidies have been reduced as capital costs have come down but the scheme is still a long way from being self-sustaining. Similarly, in the US subsidies have helped to underpin the roll-out of large-scale stationary fuel cells and Korea is emerging as a strong player across both stationary and transport fuel cells (see Figure 3).

So, what is the future for stationary fuel cells and what role can they play in reducing carbon emissions and improving air quality?

FC costs remain high but there are positive signs that costs will come down. No significant technological challenges exist and the focus of fuel cell manufacturers is now firmly on industrialisation. Evidence from numerous studies points to the FC learning curve being relatively steep with costs declining significantly as the cumulative number of units produced increases.

Stationary PEM FC in particular may benefit significantly from developments in the FC vehicles sector which relies exclusively on PEM chemistry and where the number of units produced are likely to be several orders of magnitude greater than for stationary.

The drive towards decarbonisation will underpin a shift away from natural gas and towards hydrogen as a fuel. This may in turn hasten a shift towards PEM technology (which already run on hydrogen) although several manufacturers, including Doosan, already have hydrogen-fuelled PAFC products.

Low-carbon hydrogen can be generated either from water electrolysis or natural gas in combination with carbon capture

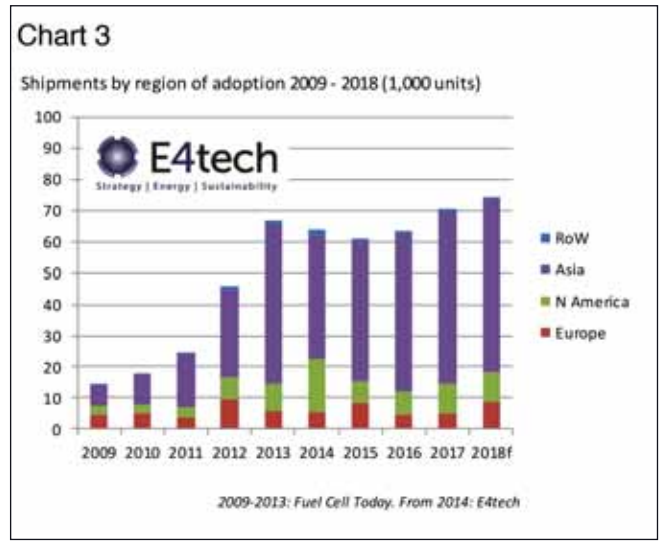

Figure 3.

and storage, and could be supplied through the natural gas grid with little modification. This would make the production of low-carbon distributed power from FCs a plausible option but FC costs will need to come down for this to be competitive with other hydrogen applications such as boilers. The supply of competitive bulk green hydrogen will be an equally-important factor and the recent fall in renewables costs gives reason to be optimistic (see Figure 4).

However, questions remain over the attractiveness of FCs in relation to alternatives. The argument in favour of FCs has frequently revolved around the high efficiencies theoretically achievable in a CHP configuration. In practice, it is very challenging to optimise the sizing and operation of any CHP unit when the heat and electricity demand have such different profiles. Many studies favour the combustion of hydrogen in local boilers or centralised electricity-generating plant, or see all-electric heating as more attractive.

In the final analysis, choices by building owners and developers will hinge on how well FCs meet the specific objectives at a given site. But, critically, centralised decisions on infrastructure such as the gas and electricity grids, as well as policy support, will also determine how widespread FC use becomes, and how quickly capital costs decline.

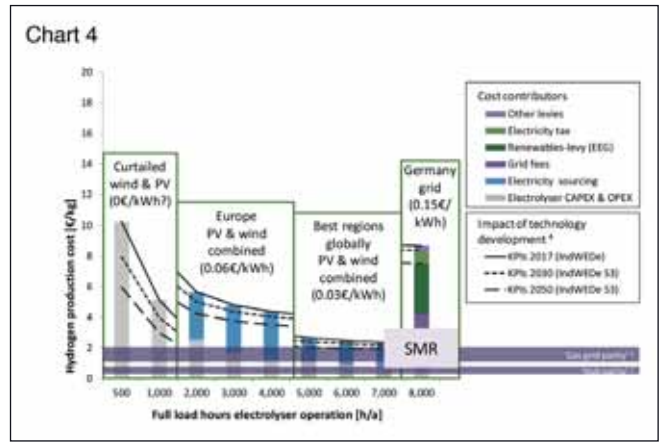

Figure 4.

THE OBTUSE ANGLE

PAT LEHANE

Bernard Costelloe's Hogan Stand Triumph

Congratulations to Bernard Costelloe, winner of the recent Hogan Hackers golf competition. The Hogan Hackers is a group of 50/60 golfing regulars who apparently frequent the Hogan Stand restaurant and pub in San Pedro, Marbella.

Apart from regular games on Mondays, Wednesdays and Saturdays, the Hogan Hackers have a major tournament twice a year. Current Captain Jimmy Nolan sent me this shot of Bernard following his recent win in the tournament played over the San Roque and El Paraiso courses.

KISS it alright

The recent Government press release on Ireland's new Climate Action Plan boasted that: "the far-reaching plan sets out over 180 actions, together with *hundreds* of sub-actions".

There is nothing wrong with being ambitious and setting lofty goals but, with multi-faceted and multi-action programmes such as those proposed, the core message is easily confused, diluted and ultimately lost sight of.

Obviously the architects of this plan never heard of the acronym KISS.

nZEB – is it nearly or net?

Who cares?, I hear you say, and perhaps you are right. Still, perception is everything. While I presume it was realism that led to the use of the term "nearly" or "near" zero energy buildings initially, I see and hear more and more commentators (in the UK especially) referring to nZEB as net zero energy buildings. Given that nZEB is aspirational and a very desirable objective, I think net zero is the more inspiring terminology.

Go green? … why bother?

At a time when we here in Ireland are donning sackcloth and ashes because of our poor performance on emissions, our European colleagues in Poland have just synchronised Opole 6 – a coal-fired generator with capacity to produce 900MW of electricity annually – to the grid.

Moreover, we are on the point of being levied fines in the millions of euros for not meeting our emissions targets while Poland, already the 10th largest coal consumer in the world, increases its use of coal.

According to the Polish Government, 92% of electricity and 89% of heating in the country is generated annually using coal. Where is the sense in adding to that in the current environment? (No pun intended).

That's not to suggest in any way that we here in Ireland should curtail our efforts to reduce our dependency on fossil fuels but really, where is the consistency – or indeed fairness – in overall EU policy.

New low in fracking

As if shooting water, chemicals and sand at high pressure into the ground to fracture rock systems to release difficult-to-reach oil and gas is not bad enough, Chinese scientists now suggest that pressure-blasting with CO_2 is greener.

They even argue that the process would have the beneficial effect of locking the CO_2 away underground for millennia. The mind boggles … could someone please tell me how is fracking any way green in the first instance?

All-Star for Alan Hogan

Not one to blow his own trumpet, Alan Hogan, Managing Director, Heat Merchants Group, has kept his recent All-Star Award close to his chest. Sorry Alan, I hope you don't mind that I've decided to share it with our readers.

Earlier this year Alan was voted *2019 All-Star Inspirational Leader* at the All-Ireland Business Foundation awards night. Apart from his own personal award, he also accepted the McEniff Trophy on behalf of the entire Heat Merchants team for the *2019 Best Business in Ireland* award. Congratulations to all.

Pictured here are Mairead McGuiness, Vice-President of the European Parliament with Brian McEniff, Alan Hogan and Dr Briga Hynes, Chairperson of the Adjudication Panel.

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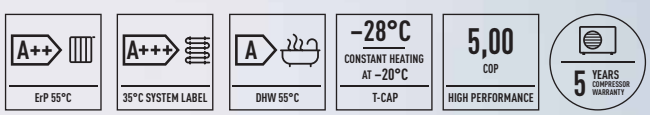

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